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EDITORIAL.

PROCLAMATION has been made that the duty on rails imported into Canada, provided for in the law passed by the Dominion Parliament in 1903, will be effective hereafter, as rails have been made in that country. The duty is $7 per ton, except on rails from Great Britain, which will pay one-third less. In this connection it may be noted that the Canadian Pacific Company recently contracted for 60,000 tons of rails in the United States. The price is not made public, but is said to be about $19 per ton, at mill. At this rate the rails will cost in Canada, duty paid, $26 a ton, or still $2 less than our own railroads have to pay for their rails.

DIVIDEND PAYMENTS by the mineral industry of the United States in August amounted to $8,680,089, reported by 41 companies to the ENGINEERING AND MINING JOURNAL. This total is better than was shown in July; a fact partly explained by the declaration of the quarterly dividend of $6,304,919 on the 7 per cent preferred stock of the United States Steel Corporation. The second largest dividend paid was the Amalgamated Copper Company, with $769,430 as a 0.5 per cent quarterly distribution. The initial payment of $210,000, or 50 cents per share, by the United States Mining Company of Utah, offset the regular dividends that have been suspended temporarily by the Central Oil Company, of West Virginia, and others. It is also gratifying to see old-time dividend payers re-enter the list, and this month the Mammoth and Uncle Sam, of Utah, after three years' absence, have declared $20,000 and $5,000, respectively.

In addition to the above, there have been paid $313,800 in dividends by two Mexican mines in which Americans are interested.

WE HEAR MUCH in this country about coal trade combinations and monopoly; but we have nothing quite as large, in proportion, to our total production, as the Rhenish-Westphalian Coal Syndicate in Germany. This combination, made up of a number of companies, controls the sale of more than two-thirds of the coal mined in that country. It directs the general policy and manages the sales of all the coal produced by its members; and indirectly it has

an important influence on the iron trade, since it established the prices of coke and coal used in that trade to a large extent. Just now it is actively engaged in pushing exports of German coal, especially to France; but with only moderate success so far.

NOT MUCH IS being said just now about exports of iron and steel, though the official returns show considerable gains over last year in this trade. Whatever work is being done in the direction of sales abroad is in a quiet way. Last year and in 1902 the home demand was so large that there was no surplus for sale abroad. The work done in previous years was therefore dropped, and must now be largely done over again. An expert demand would be of value now, to make up shortages in home trade and keep mills busy. Undoubtedly something is being done in that direction, but the managers do not want to say too much about the work, for various reasons, prominent among which is the contrast between home and export prices.

THE OFFER OF the German Government to buy the property of the Hibernia Coal Company, one of the largest coal mining concerns in the country, has been rejected by a decisive vote of the stockholders. Only a very small minority declared in favor of accepting the terms offered. It is understood that the tender made to the Hibernia was the first move towards the acquirement by the Government of a considerable part of the coal-producing capacity of the country. This policy was taken up, not to supply the needs of the public service and of the State railroads, but to give the Government a share in the coal trade, which would enable it to regulate prices and production. It is strongly opposed by most German coal operators, who do not wish official interference.

THE QUESTION OF the relative efficiency of the steam turbine and the reciprocating engine is widely debated, and yet unsettled. In general the turbine seems to have the better of the argument for large units for steady duty, where superheated steam is used and a low vacuum maintained for the exhaust. The question of the efficiency of the high duty turbine or centrifugal pump is more debatable, though such pumps are in successful service at mines in continental Europe, and several concerns are manufacturing them in this country and giving out statements as to the work the pumps will do. It would seem from the present status of the arguments that the chief factor that manufacturers will have to overcome in centrifugal pumps for high lifts will be that of deterioration from use, particularly where mine waters are acid or gritty. A worn valve in a direct-acting pump, of good construction, can be replaced cheaply. Any wear of propeller blades, however, is likely to lead to considerable slip losses when working against high heads, and replacements seem likely to be costly. However, the theoretical advantages of the centrifugal pump, its compactness and possible high efficiency, will undoubtedly lead to its being given extended tests under conditions that will bring out any defects.

THE MINING CONGRESS.

During the past week the annual session of the American Mining Congress was held at Portland, Oregon. Despite the obvious lack of widespread support from the industry, to the advancement of which it is dedicated, the Congress has held together for seven years, and by the very fact of that evidence of vitality it appeals to the earnest consideration of those interested in mining. If it did not succumb to the weaknesses inherent in the personnel of its first organizers, it is because two or three forceful men, actuated by sincerity of purpose, have slowly gained control and rescued the organization from the quicksands of self-interest. As an annual meeting of boomsters, notoriety seekers and mining promoters of a provincial type, the Congress, in the past, has provoked more ridicule than respect; as an organization devoted to the advancement of the best interests of mining in a broad national spirit, it has begun to command support. It may be that, of the two characterizations just offered, the first will be considered by some of our readers as unfairly destructive, while others will regard the second as unduly sanguine. But to understand the nature and appreciate the proceedings of conventions so loosely held together, it is necessary to recognize cross-purposes, as diverse in their action as they are in their intention. Sooner or later it becomes a question which development will dominate, and it has long been clear to us, as interested observers of the successive meetings of the Congress, that either it would succumb to the merely talkative manifestations of activity, or it would emerge out of the irregularities of youth and grow into an instrument of lasting benefit to that industry, to the service of which this JOURNAL also is devoted. To those who did not attend the meeting at Portland we commend the address of Mr. J. H. Richards, the president, the larger portion of which will be found on another page of this issue. By the earnest conviction and sincerity of purpose voiced in that address it will be evident that its official spokesman, at least, has traveled a long way from the vagaries which disfigured earlier sessions of the Congress; the president—happily he succeeds himself—represents the enduring quality, the patriotic purpose and the sustained hope of that mere handful of men who have, so it seems to us, rescued the Congress and placed it at last on the high road of successful endeavor.

The recent meeting proves this. We learn, on trustworthy authority, that the Portland meeting contained more representative men and was in every way a more serious convention than its predecessors. There was a lot of time spent, as usual, in deciding upon the next place of meeting, but this disturbing—and time consuming—factor is to be eliminated in the future by the decision to have permanent headquarters. That Denver is the city chosen for this purpose is fortunate, for by its geographical position, railway communications, climatic and other advantages, the business center of Colorado is also eminently adapted for national conventions. Next year half the time of the Congress will not be yielded to a contest between rival deputations from different mining centers, and the time hitherto lost on this account will, we hope, be given to the consideration of the many matters vital to the mining industry of the whole country. We will return to this subject again. For the present it suffices to say that while we have criticised the Mining Congress in the past with a frankness, which had in it no touch of enmity, we purpose in the future to support it with a sincerity no less outspoken, believing that it is an organization which warrants the support of public spirited mining men in their desire to find a voice for the needs of an industry which is among the most beneficent known to our busy humanity.

MINING INVESTMENTS IN MEXICO.

Mining ventures in Mexico have attracted a large amount of American capital. This movement of capital started before 1893, in fact it owed its origin largely to the building of reduction plants in Mexico after the United States, by the imposition of heavy import duties on smelting ores, virtually compelled certain of our large smelting companies to import bullion instead of ore. From the erection of reduction works it was but a step to the acquisition of mines to supply such works, and the flow of American capital into Mexico was steadily increasing when the panic of 1893 and the fall in the price of silver temporarily demoralized silver mining and checked the investment of American capital in undertakings at all speculative. With the return of financial confidence and the succeeding great expansion in industrial undertakings, that have characterised the years since 1898, Mexican investments again received attention and probably have been fully as profitable as investments in American mining companies. There have, of course, been some flotations that were purely speculative and a few that were not planned in good faith, but the number of failures has been small, except for the short-lived boom in El Oro, and there have been no blind-pool scandals.

Mexico, free from the fear of political troubles and with her finances in better shape than ever before, is a tempting field, and not only mining properties but concessions for railroads, power transmission plants and manufacturing enterprises of various kinds are being sought.

In this industrial expansion the companies that were the first to start the flow of American capital into Mexico, or their successors by consolidation, have been prominent, although the unexpected success that attended the exploitation of certain copper deposits in Sonora has probably played fully as large a part in drawing the attention of the American public. Although estimates have been published from time to time of the total amount of American capital invested in Mexican mines, metallurgical works, railroads and industrial enterprises, these estimates are for the most part little better than guesses, and call for no comment. It is enough to repeat that a large amount of American capital is invested in Mexico and, as our news columns from week to week show, this influx of capital continues, diminishing little, if at all. Possibly the future may bring disturbing political conditions, possibly the Mexican laborer may form unions that will be as ignorant, arbitrary and arrogant in their leadership as any in this country, possibly the development of the country's resources may temporarily outstrip the consumptive capacity of the country and the possibilities of export trade, thus leading to a period of depression; but while President Diaz rules or while the government is in the hands of a successor as strong and sagacious as he, Mexico is not likely to see a political revolution, and the growth of labor unions or the over-development of the country's resources is a matter that the American investor need give himself no concern about at present.

So far the investments of American capital in Mexico have been almost wholly through large corporations already having a foothold there, or through new concerns floated in this country; that is, the investments have been in large undertakings. Unquestionably, however, there is a good outlook in Mexico for the man with small capital who is able and willing to give personal attention to his investment. As is generally known, most Mexican mining camps offer few inducements to the American miner or prospector. Living expenses, unless a man is willing to live on a different scale to what he has been accustomed, are high, the opportunities for recreation are few or non-existent, and the scale of wages, while rather high in a few boom camps, is not especially attractive. On the other hand, there are many opportunities for the small investor, a man with $10,000 to $25,000, who is not afraid of isolation, hard work and poor fare. In the Republic are vast stretches of territory where good returns can be secured by a man of sense, who will stay on the ground. There are many little mines of the five-stamp class to be opened which have been rejected by the experts seeking property for large companies; these, if worked with care, in a small way will pay well. There are also out of the way places where a small smelter will yield handsome returns, if erected as the result of tests made on the ores to be treated, since in such localities custom ores can often be found on advantageous terms. The mining laws of Mexico are liberal, investors are welcome and there is little to fear from such vexatious and interminable litigation as is due to our own mineral land law. The climate at most camps, though the summer temperature may be high, is generally healthful. The influx of such small investors will unquestionably benefit Mexico in many ways; not the least of these will be the making of a closer industrial relationship between Mexico and this country.

RESPONSIBILITY OF MINERS' UNIONS.

The British Columbia courts have rendered a decision of considerable local importance, in the case of the Centre Star Mining Company against the Rossland branch of the Western Federation of Miners. This case arose out of the Rossland strike of three years ago, and seems to settle, as far as British Columbia is concerned, the pecuniary responsibility of a miners' union for damages occasioned by a strike. The trial has been delayed for various reasons, but the decision seems to be an emphatic one. The Centre Star Company sued the union for $50,000 damages sustained by it, as a result of the action of the defendant union in "maliciously conspiring" to bring about a sympathetic strike among the company's employees. In July the jury in the case found for the plaintiff, and fixed damages at $12,500, but the formal rendering of judgment was deferred until August 17, pending the consideration by the court of some points of law.

The question submitted to the jury related to matters of fact, such as the existence of the miners' union, the declaration of the strike, the existence of a conspiracy within the terms of the law, the maintenance of the strike by picketing, intimidation and other means, and the fact whether the union was responsible for these proceedings. The final judgment handed down by Mr. Justice Duff is as follows:

"I think there was evidence on which the jury could properly find for the plantiffs on all the questions submitted to them. The defendants' application for a non-suit is therefore dismissed.

"The plaintiff company is, on the findings, entitled to judgment against the Western Federation of Miners, Rossland Branch, both under that name and under the name of which the organization was known, the Rossland Miners' Union No. 38, Western Federation of Miners, for $12,500, the amount of damages found by the jury; and judgment for this amount should also be entered against all the principal defendants except those joined for conformity only. There will be an injunction against all the defendants as claimed by the plaintiff company at the trial."

The case is of such importance that it is quite probable an appeal will be made from the British Columbia Court to the Supreme Court of Canada, the tribunal of last resort. Whether the Rossland union is so far responsible that the amount of judgment can be recovered is a minor matter. The important point is that under Canadian law such a body can be held pecuniarily responsible for damages resulting from its action, and also that such action can be regarded as conspiracy under the law. The decision cannot fail to have a sobering effect upon the Canadian branches of the Miners' Federation.

COARSE CRUSHING AND RE-GRINDING ON THE RAND.

Our London correspondent calls attention to the somewhat curious fact that journals and dealers in mining stocks have hailed some recent developments in mining practice on the Witwatersrand as new discoveries, which will "revolutionize" the cost of mining and double the output of the district. That these developments have been taken up in this way shows rather painfully the condition of the market and the manner in which even a small change for the better is welcomed. As a matter of fact, the changes referred to have been mentioned at length in our columns at different times, and were again spoken of in the editorial on 'Recent Practice on the Rand,' which was published in our last week's issue. They consist simply in the introduction at some mines of the practice of coarser crushing than heretofore by the stamps and the re-grinding of the tailings before cyaniding. The additional machinery used for this purpose has been principally tube mills and flint mills, and these devices are referred to by some of our London contemporaries as though they were entirely new. This question of coarse crushing and re-grinding was first brought up in South Africa by Mr. H. S. Denny, in his paper which was read before the Chemical, Metallurgical and Mining Society of South Africa in July, 1903. Mr. Denny's suggestions were at once taken up by several members of that Society, which includes many of the mill managers of the Rand, and have been put into practical use at several mines. Mr. Denny himself has been a leader in this improvement, as was stated in the editorial above referred to, and has succeeded in obtaining a much closer extraction than heretofore. Conditions of the industry on the Witwatersrand are such that every gain made in this direction, even though small in itself, is a great advantage, as long as the increased saving of gold exceeds the cost of the new procedure.

Involved with the laudation of the new process is a little controversy as to the credit due for its first introduction. It seems to us that there is no question on this point. So far as we can ascertain, no mention of the advantages of re-grinding or of the use of tube mills, or flint mills, was seriously made before the reading of Mr. Denny's paper, and he is fairly entitled to be considered the first engineer who set forth the advantages of coarse crushing and re-grinding tailings as applied to South

Africa. He did not, naturally, claim to be the inventor of the process, modestly limiting himself to the following, which appears in a recent communication to the South African Society:

"What I have done is to collate all the evidence, both mechanical and metallurgical, available in regard to such a process (referring, of course, to the use of flint mills, re-grinding, increase of stamp capacity, etc.), and by careful experiments on Witwatersrand ores to establish first the principle, and subsequently detailed improvements in the working of it, to enable us to apply it here in an improved form and to the material benefit of our operations."

Nevertheless, it seems to us that if an engineer can by adopting the process of other countries bring about improvements in metallurgical practice which are going to benefit the community to which he belongs for the time being, he has done something worthy of credit, although he did not originate the process which is responsible for the improvement. This much credit is certainly due to Mr. Denny, if, as now appears probable, the coarse crushing and regrinding results in a substantial improvement of metallurgical practice on the Rand.

MARKET CONDITIONS.

Aug. 31.

The metal markets show, in some directions, an increase of activity. Copper, however, remains about the same as last week. Domestic demand has fallen off sligthly, but foreign orders continue good. In tin there is no material change. In lead the demand for consumption is strong, and the principal seller has advanced prices this week $2 per ton. Spelter is very strong, and advancing. Consumers in this country are not well supplied, and current demand for metal is good. Moreover, supplies abroad seem to be short, and we have had this week the unusual occurrence of the taking of 5,000 tons for export.

Silver has been rather weaker, demand from the East having fallen off. Exports continue large, however, but the price is somewhat lower.

The iron and steel markets show slight increases of strength in some directions, but in others are still weak and demoralized. The only encouraging feature is the starting up of a number of furnaces and mills in the Central West.

The Western coal trade continues quiet, with only a moderate demand for steam coal. There is nothing new in the Lake trade.

The seaboard bituminous trade continues quiet. Many dealers expect a revival of interest, but there is also an impression that the regular fall buying has been somewhat discounted already.

The anthracite trade is even duller than it has been, and producers are restricting outputs. Many collieries will be closed for a week and all will close on Labor Day, and it is thought that the principal producers will endeavor to keep the September output close to 4,000,000 tons.

METALLICS.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

Catlinite is the name given to an indurated clay rock once used by the Dakota Indians for pipe material. It is also called Indian pipe-stone.

The black sands of the Quesnel river, in the Cariboo district of British Columbia, contain some platinum and osmiridium. These metals have not received much attention, owing to the difficulty of saving them.

The greatest accumulation of coin in the world at present is that held by the Bank of France. At the beginning of August this amounted, in round figures, to 2,702,292,000 fr. in gold, and 1,125,920,000 fr. in silver; a total of 3,828,212,000 fr., or $765,642,400 in United States currency.

Greensand is a loosely coherent clayey or sandy deposit, composed largely of the mineral glauconite—a hydrated silicate of iron and potassium. Owing to the presence of the latter element it is often employed as a fertilizer.

Most of the feldspar used for pottery purposes is orthoclase, or the potash variety, which is found in granite, gneiss, syenite and mica-schist. The basic or lime-soda feldspars are generally associated with dark-colored minerals from which they cannot be easily separated.

Phosphate rock is of organic origin, largely derived from guano and decaying animal matter which contains phosphoric acid. In rainless regions such as the Peruvian coast and some of the Pacific islands, the guano may accumulate to great thickness without loss of soluble matter. In moist districts, however, the phosphoric constituents are dissolved out by percolating waters, and the solutions coming in contact with limestone may convert the latter into lime phosphate. The phosphate deposits of Florida are thought to have been formed in this manner.

The quantity of gold coin in Great Britain at the close of 1903 is estimated by the Royal Mint at £100,000,000, of which £63,500,000 may be actually in circulation, and £36,500,000 in bank reserves. Although the wealth of Great Britain is greater than that of France, and its commercial activity also greater, the amount of coin in circulation is much less than in France. This is due to the much more extended use in Great Britain of checks and similar evidences of credit in transactions and payments of small amounts, where coin is used in France.

The total production of gold in Australia, from the first discovery in 1851 to the end of 1903, is estimated by the Secretary of Mines of Victoria at 128,851,396 oz. crude, valued at £494,378,331. Of the different colonies contributing to the output, Victoria leads with a total of 66,736,336 oz., valued at £266,810,711, New Zealand is second with a total of 16,105,821 oz., valued at £63,149,147, and Queensland third with 17,454,418 oz., valued at £58,312,127. Western Australia, which in 1903 produced more than 40 per cent of the output credited to Australia, stands fifth with 12,410,773 oz., valued at £46,441,031, being surpassed by New South Wales with 13,932,667 oz., valued at £51,426,814. Tasmania has produced 1,265,837 oz., valued at £4,905,706, and South Australia 676,763 oz., valued at £2,324,658. The remainder of the production, amounting to 268,781 oz., valued at £1,008,137, was obtained by smelting companies in New South Wales from imported ores.

The question has arisen whether diamonds will not become 'dirt cheap' by over production. As yet the price has not fallen. Neither De Beers nor Premier can afford to war against each other. Between them they will control the market, and keep the price up. To the argument that the price of diamonds will fall through the discovery of new mines in the Transvaal, it may be stated that it has taken diligent search of all these years to find the Premier, and it is highly improbable that another such deposit will be discovered. Even then the chances are that either De Beers or Premier will get control of the new discovery. The Premier mine will prove the same industrial blessing to the Pretoria district, that De Beers has proved to Cape Colony. Land in the neighborhood has fair agricultural advantages, and the company intends cultivating some of these tracts. Farmers will get inducements to enter the valleys, for with such a large mine there will be a better market for their produce.

Of the iron ores mined in the United States in 1903 it is estimated that 86.6 per cent were red hematites; 8.8 per cent brown hematites; 4.5 per cent magnetites; 0.1 per cent carbonates. The line between the red and brown hematites is, however, not clearly defined.

The greatest quantity of iron ore produced from one mine, in 1903, was 1,519,450 tons from the Fayal mine, on the Mesabi range in Minnesota. The greatest quantity from any southern mine was 1,231,409 tons from the Red Mountain group, in Alabama; from any eastern mine, 401,470 tons from the Cornwall group, in Pennsylvania.

The State of Pennsylvania, which makes more than half the iron used in the United States, produces less than 2 per cent of the iron ore mined. Ohio, which comes next to Pennsylvania as an iron-maker, mines only an insignificant quantity of ore—less than 0.1 per cent of the total. In both cases the ore is brought to the fuel; and this is the general policy in this country. Only in Alabama are the ore and fuel found together.

There were six mines in the United States which produced over 1,000,000 tons of iron ore each in 1903. Five of these—the Fayal, the Mountain Iron, the Adams, the Stevenson and the Mahoning—are on the Mesabi range, in Minnesota; the sixth is the Red Mountain group, in Alabama. Eleven other mines shipped over 500,000 tons and less than 1,000,000 tons each. These were the Biwabik, the Spruce and the Burt, on the Mesabi range; the Pioneer and the Chandler, on the Vermilion range, in Minnesota; the Chapin, the Cleveland Cliffs and the Pewabic on the Menominee range in Michigan; the Aragon and the Lake Superior, on the Marquette range; and the Norrie, on the Gogebic range.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of the ENGINEERING AND MINING JOURNAL.

MINERALIZATION AND GANGUE.

The Editor:

Sir.—With regard to the discussion in the JOURNAL pertaining to correct technical terms, although somewhat late, I would suggest that possibly 'mineralization' and 'gangue' are often misapplied.

The former term is at times, to say the least, very loosely applied—and looking into the matter somewhat more closely, often meaninglessly. For instance, one often comes across such expressions, as, 'the vein is heavily mineralized,' or 'the wall-rock is mineralized for a distance of, etc.' These statements are, in reality, equivalent to stating that mineral is mineralized, which is simply a truism and *per se* is not capable of expressing what is intended, unless we read into the term a meaning which is not self-contained, although, possibly, from long usage, or rather mis-usage, understood.

Of course, we all know what is implied, but that is rather a tribute to the intelligence of the reader than the author; but, at the same time, the implication is not intelligently stated, and, strictly speaking, is therefore not permissible. In a recent work descriptive of mineral deposits by an authority, well and deservedly well known, there appears this sentence, 'R. to E is an outer band of obviously brecciated sandstone containing very little evidence of mineralization.' Doubtless, from such an authority this will be accepted as a lucid statement of what the author desires to convey, but can it be said to be an exact or scientific one? If so, then to state that the vein is highly mineralized is also correct, which, strictly interpreted, may mean that the vein is heavily charged with metallic compounds of economic importance or simply clean quartz—since quartz is a mineral as much as any metallic compound—and therefore valueless. Now, if both these are legitimate interpretations, there would appear to be something loose here. It would appear that a more explicit statement regarding enrichment or alteration of either vein or 'country' is requisite for both intelligent description and appreciation.

Again, with regard to 'gangue,' I noticed in a former edition your specification that gangue applied to the earthy constituents of veins. *Ganga*, in Spanish, means the stony material found in veins according to Valasquez, who also gives *gangue*, its French equivalent, as 'the bed or matrix of minerals.' My own impression was that gangue, strictly speaking, relates to the entire vein filling, otherwise than the minerals of economic importance sought, and regardless of any physical features.

Gangue, therefore, in a simple quartz vein with metallic gold would refer to the quartz; in a pyritous lode, like that of Rio Tinto or Le Roi, to the pyrite and pyrrhotite—that is, if the copper and gold occurred in the chalcopyrite—in a lead-silver vein, to the pyrite, spathic iron, barytes, quartz, etc., all, in fact, of the accompanying minerals that are not of economic value.

Some time since I remember reading in a report some such sentence as this: 'The vein is of considerable width but *badly ganged*.' This, to me, was altogether a new application of this borrowed but ill-treated stranger, and appeared to me to be both grammatically and descriptively defective. The import of the words was, however, obvious; that the vein, whose minerals of economic importance were lead and silver sulphides, was composed too largely of worthless constituents, and thus rendered practically valueless. If, however, it is correct to state that a vein or rock, composed essentially of minerals, is highly mineralized, on the plea that, although not a correct statement, scientifically, yet its meaning is perfectly obvious, from customary usage or otherwise. Then the converse would also appear legitimate, that a vein was badly ganged, since that even is capable of interpretation and in time would even become familiar, notwithstanding the fact that, literally, all that is stated is that the vein is excessively filled with accessory minerals, without which there would, except in rare instances, be no vein at all.

Noticing also the tendency to simplify descriptive terms, and the avoidance of unnecessary words, and even letters, I would suggest that 'country-rock' be outlawed—the simple 'country' being shorter and equally descriptive.

I therefore bring these terms forward, wishing to ascertain, especially for the first, what is the lawful and correct use applicable to the description of mineral deposits.

H. E. WEST.

Matagalpa, Nicaragua, July 24, 1904.

IRON SOWS IN PYRITIC SMELTING.

The Editor:

Sir.—In looking over the recent numbers of the JOURNAL, my attention is attracted by the letter of Messrs. Meyers and Reybold, in the issue of July 21, questioning the theory of the formation of iron sows by oxidation in pyritic smelting which was advanced recently in a paper published in the *Transactions* of the American Institute of Mining Engineers, by Mr. Theo. Knutzen and myself.

In place of the oxidation theory they advance the theory of the reduction of metallic iron from iron sulphide by means of carbon (coke), which is practically a re-statement of Dr. F. R. Carpenter's opinion concerning the formation of iron sows given in the discussion of his paper, 'Pyritic Smelting in the Black Hills[1].' Messrs. Meyers and Reybold are careful to state that they believe the sow to be formed in the crucible of the furnace only, while Dr. Carpenter believes it to be formed by reduction throughout the furnace.

It seems to me that the formation of iron sow from matte in the furnace crucible is an untenable theory, for several reasons, some of which follow.

In the metallurgy of iron, in blast-furnace practice, where reducing conditions are certainly very strong, the desulphurization of iron by means of carbon according to the equation,

$$C + 2FeS = 2Fe + CS_2,$$

is not recognized by any authority. The desulphurization of iron is stated to be due to the following reaction, provisionally given by Prof. H. M. Howe,[2]

$$FeS + CaO + C = Fe + CaS + CO.$$

The desulphurization does not take place except under such extreme reducing conditions that lime is de-oxidized. No one can claim these conditions for the pyritic furnace. If the reaction, $2FeS + C = 2Fe + CS_2$, were the one that occurred readily, surely cast iron which may contain from 2 to 5.5 per cent of carbon would be practically sulphur free. However, it takes up sulphur readily under most conditions, when re-melted in the cupola with coke containing sulphur.

While Messrs. Meyers and Reybold cite Mr. Bolles'[3] experiments that iron oxide and iron sulphide when melted together fail to produce metallic iron, they overlook the paragraph following in which he states that iron sulphide and carbon, melted together, also fail to produce metallic iron, nor will poling raw matte with green wood produce iron. Mr. Bolles states, however, that the fusion at a high temperature of a slightly oxidized iron matte yielded about 6.5 per cent of iron bottoms.

The production of iron sows seems to be confined quite closely to pyritic furnaces, or those which are admittedly smelting under oxidizing conditions. Messrs. Meyers and Reybold offer evidence along this line in their letter. If sows were due to the reduction of iron from matte by carbon, it would seem that in copper smelting as carried on at Butte, where the furnaces work with a more nearly reducing atmosphere, sows would be very common. This, however, does not seem to be so. The late Van F. Furman, in his discussion[4] of Dr. Carpenter's paper above mentioned, makes the remark that at the present day the manager of a lead or copper blast-furnace plant would not hold his position long if sows were a frequent product of his plant.

In view of the statement by Messrs. Meyers and Reybold that Mr. Knutzen and myself have nothing substantial on which to base the theory of the production of metallic iron sows by oxidation, I will re-state the evidence the theory is based on.

1. Iron sows are seemingly unavoidably produced in pyritic furnaces where the conditions are admittedly oxidizing. They are not common in normal copper smelting where the furnace conditions are probably reducing.

2. At Rapid City and at Deadwood, also, as stated by Dr. Carpenter, at certain times no matte would be produced in the furnace, so that the slags could be expected to run high. This, however, was not the case, and the conclusion reached is that metallic iron forms during these periods. It would seem that this iron, in view of the highly oxidizing action of the furnace, could not be produced by carbon or carbon monoxide, the latter gas not even being present in the furnace gases to an appreciable extent. As evidence that the furnaces at Rapid City were oxidizing, it might be stated that the normal desulphurization was 78 per cent, and that no oxidized iron compounds entered the furnace but that the slag contained from 18 to 20 per cent. of ferrous oxide as silicate.

3. The matte contains metallic iron, as is also stated by Messrs. Meyers and Reybold. Even after a furnace has just been blown in after cleaning out, the matte formed contains metallic iron. This, then, must be formed during the descent of the charge, as there are no hearth accretions from which the matte could take iron, even if this were possible.

4. Clean pieces of iron sow on analysis show no carbon contents, as would be expected if the iron were reduced by carbon.

5. There is a good basis for the reaction stated by us, namely,

$$FeS + 2FeO = 3Fe + SO_2.$$

This reason is probably by no means com-

[1] *Transactions*, American Institute of Mining Engineers, Vol. XXX

[2] 'Iron, Steel and Other Alloys'

[3] 'Pyritic Smelting in the Black Hills.' *Transactions*, American Institute of Mining Engineers, Vol. XXX.

[4] 'Concentration of Gold and Silver in Iron Bottoms,' American Institute of Mining Engineers, September, 1904.

plete, and takes place only to a limited extent when the ferrous oxide is present in excess, as in the case of pyritic smelting when high concentration is carried on. This reaction is given by Professor Howe[5] as one of the reactions in the bessemer process for steel, although it is stated that it takes place only to a certain extent.

The amount of metallic iron sow produced, compared to the quantity of matte and slag, is very small. At Rapid City in a three months' run, a 5-ton sow was produced, while the matte product of the furnace during this time was 572 tons, the sow amounting to less than 1 per cent of the matte. Larger sows than this, however, are often produced, amounting to 2 to 2.5 per cent of the matte.

CHARLES H. FULTON.

Rapid City, S. D., Aug. 21, 1904.

OUTPUT OF BRITISH MINES.

BY AN OCCASIONAL CORRESPONDENT.

The report of the mines and quarries for 1903 shows that metal mining in Great Britain and Ireland is not in a healthy condition, while on the other hand the mining of the non-metallic minerals is steadily increasing.

The following table shows the decrease by decades since 1873, the year when the Metalliferous Mines Act first came into operation:

Av. 10 years ending,	1882	1892	1902	Cornwall and Devon. 1903
	tons	tons	tons	tons
Arsenic	5,666	6,112	4,093	902
Arsenical pyrites	8,666	4,197	6,886	57
Copper ore	64,724	20,267	7,286	5,351
Lead	73,357	49,651	34,480	9
Manganese	3,316	7,162	1,003	15
Tin ore	14,114	14,429	8,741	6,491
Wolfram	30	117	65	272

In the above list, take copper ore, and I find that Cornwall and Devon from 1850 to 1856, both years inclusive, yielded 175,000 tons of copper ore of an average produce of 7.25 per cent, equal to 12,500 tons of fine copper, and realized $5,000,000 a year, exclusive of $13.50 a ton returning, or smelting, charges, or a total of $6,362,000 a year. The precious metals show an increase, gold ore from 32 tons in 1875 to 29,053 tons in 1902 and 28,000 tons in 1903. This gold was mined at the St. David's gold mine, Dolgelly, North Wales; the 58 tons of silver was mined near Maragion, Cornwall, and realized $9,083, an average of $156 a ton. Wolfram last year established a record both in tonnage and price. The price in 1902 averaged less than $125; last year the price jumped to $400, or $7 a unit, and some parcels have been sold as high as $490 per ton this year. Cornwall last year produced 269 and Devonshire 3 tons. This year should see active prospecting around Hemerdon, Dartmoor for the mineral, Wheal Bunny mine, St. Austell, Clitters at Gunnislake, East Pool, and Carn Brea mines should all give a good account of themselves for wolfram. The last-mentioned mine has recently put nine men to work at the 170-ft. level to break this ore, which is now used for the hardening of tool-steel and other purposes. Uranium ore—in spite of the thousand and one new elements found in it—has decreased from 52 tons in 1902 to 6 tons in 1903. The uranium mine at St. Stephen's, Cornwall, suspended operations in March of last year, and is now advertised for sale. It is well equipped with machinery. This mine did well for a time, as the ore was used to give a peculiar light blue tint to glass; the usual price for a 1-in. cube being $1.

[5]'Iron, Steel and other Alloys,' p. 328.]

The following table shows a wonderful increase in the mining and quarrying of the non-metallics during the same period:

Av. of 10 years ending.	1882	1892	1902
	tons	tons	tons
Alum shale	7,697	3,914	3,912
Barytes	18,970	24,408	23,819
Bauxite	4,906	9,193	9,312
Fluorspar	464	267	1,386
Gypsum	72,213	126,316	189,159
Ocher and umber	5,904	12,324	13,362
Salt	2,373,648	2,160,129	1,959,089
Slate	196,000	459,107	557,925

The price of tin was well maintained throughout the year, the lowest price being $540, the highest lowest price for any year since 1871, and double the price in 1896. The Devon mines only employed 369 men, as against 434 the previous year.

The Devon United mines are still prospecting and crushing a little tin ore, but there is no vigorous work on account of insufficient capital. The Sticklepath mine, near Okehampton, is being prospected for copper by local capital.

In Cornwall the Clitters mine has done well, and while treating 2,500 tons a month does not require a large acreage to prepare it for market, as in the older mines. This company is working the Hingston Downs, an adjoining mine, and modern methods have been adopted. The Prince of Wales mine has been worked on a very limited scale. Kit Hill mine has made a good profit from exploration work.

In the St. Austell district several mines and prospects started last year. The Minear Downs Pit crushed rock which yields from 4 to 5 lb. of tin per ton. This pit is about 120 ft. deep, with a width of 80 ft. Ventonwynne, Commerce, Polmear, Wheal Bunny and others are at work, the two latter with modern machinery.

In the St. Agnes district, Wheal Kitty has recently had to close down after over 50 years of continuous working. West Kitty has lost money this year; this little mine has paid over $2,000,000 in dividends during the past 25 years. Tywarnhaile mine has been idle since the beginning of the year. The dumps crushed contained 0.6 per cent of copper, but an effort will shortly be made to re-start, as it is thought that with proper classification even such low-grade ore can be worked at a profit.

The mines in the Camborne and Redruth districts are "as you were." Dolcoath is still the premier mine as regards antiquity, labor, and production. The sinking of William's or New Shaft has been discontinued. The sinking 220 fathoms and equipment represents an outlay of $200,000. The owner of the ground, at the last meeting, consented to return 50 per cent of the dues for the next three years, as no dividend has been paid for years. Carn Brea & Tincroft is coming to the front, the tin sales have increased by 12 tons a month, making the mines self-supporting. Wheal Grenville and Wheal Basset mines for nearly six months suffered from an excess of water, but are now yielding the usual quantities of tin. South Crofty mine has not yet entered the dividend list, much to the regret of the shareholders. The expenses have been very heavy, owing to the sinking and equipment of a new shaft. In some quarters it is thought it would have been better to have installed a small electric pump instead of building a large engine house and erecting an 80-in. cylinder pumping engine. The power house of the Electric Tramway Company is close to the shaft. The sinking during the past 16 weeks was about 6 ft. a week.

St. Just district has its Levant, which is still able to pay dividends from its tin and copper. The Maragion district has a few prospects at work.

To show how mining has decreased in Cornwall, it is only necessary to compare the number of persons employed in 1852, when 30,000 were engaged—19,000 men and 11,000 women, boys and girls—with 1903, with a total of 6,146 3,440 of whom are engaged under and 2,706 above ground.

Dark as Cornish mining may appear, there is a 'silver lining' in the matter of classification. Experiments have recently been made on a working basis which shows that crushing through a 10-mesh instead of a 30-mesh—the aperture writers will please pardon the expression—70 per cent of the pulp contained but little values, and is discarded, thereby increasing the capacity of the machinery 300 per cent, to reduce the wear and tear, the working costs, the loss in the tailings, and to increase the value of the concentrates. Mr. Abelspies, of the Polmear mine, has paid great attention to classification, and has applied his system to the complex ores of the mine. Mr. Martin, one of the professors of the Truro Technical School, has patented a classifier which should, if largely used, do much to revive Cornwall. Now, in the mines the tin is crushed very fine, in some cases so fine as to render it useful on strops to whet razors. It has been said that after crushing to a 10 or 15-mesh, fully 50 per cent can be immediately rejected, and that it contains less value than after going through a dozen or more mechanical and manual treatments. The coarser the ore can be concentrated, the better.

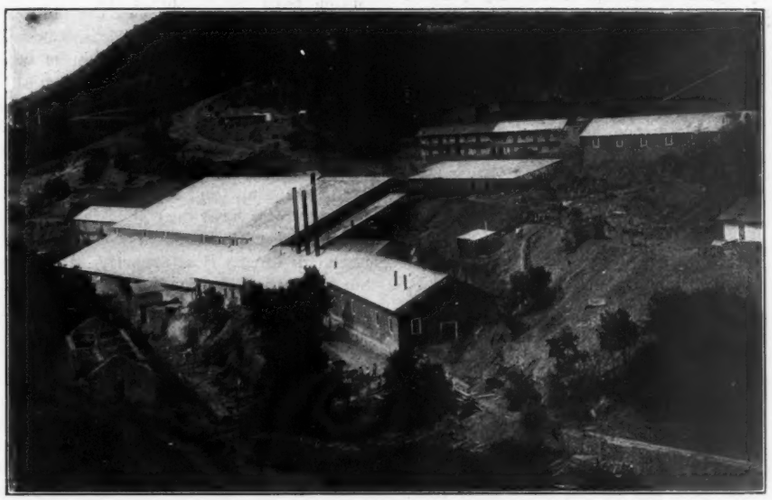
COAL NORTH OF THE ARCTIC CIRCLE.—Mr. Athur J. Collier, of the United States Geological Survey, was assigned, this season, to the work of examining the coal-fields in the neighborhood of Cape Lisburne, Alaska, which lie on the Polar Ocean, far north of the Arctic circle, and are accessible only during the summer months. Mr. Collier reached Nome early in July and went thence by whaler to his field of operations, where, with the assistance of Mr. Chester Washburn, he will make a careful examination of the coal found in this vicinity, with a view of determining definitely whether it is of commercial value for export.

COAL AND PETROLEUM IN ALASKA.—Mr. R. W. Stone, of the United States Geological Survey, reached Homer, on Kachemak Bay, on the west side of Kenai Peninsula, early in June, and spent about three weeks in making a careful examination of the Kachemak coal fields. This coal area was the scene of the earliest mining operations in Alaska. It was discovered by the Russians about the middle of the last century and since that time has been spasmodically exploited, though its aggregate output has been small. It is hoped that a careful survey of this field may reveal the facts that some of the seams are of sufficient size and that the coal is of the requisite quality to furnish a fuel supply for this part of Alaska. Toward the end of June Mr. Stone joined Dr. G. C. Martin, who had been making a re-examination of the Enochkin oil field, on the west side of the Cook Inlet. Together they went southward to make a careful examination of the mineral resources of Alaska Peninsula, including the oil fields of Cold Bay and the coal deposits of Herendeen Bay.

NOTES FROM THE LOUISIANA PURCHASE EXPOSITION.

EDITORIAL CORRESPONDENCE.

The fine exhibit of Mexico in the Mines Building at St. Louis was assigned a floor space of 1,000 square meters. It is situated in one corner of the building, having thus walls on two sides. On the third side is a partition separating it from the adjoining space, while on the fourth is a railing, with artistic entrances. Provision was made for 110 large show-cases, but these were found insufficient.



DOS ESTRELL ASMINE, MEXICO.

and it has been necessary to utilize all the wall spaces. There are over 300 exhibitors of all classes; prominent among them are the States of Durango and Zacatecas, which make special exhibits of their varied mineral resources.

All the States of the Republic are represented, and nearly every mining company of any importance has sent samples of its ores and products. Silver and lead ores are naturally the most prominent, but gold, copper, antimony and iron are also represented; and there are also specimens of nickel ore from a deposit lately opened in Pihuamo district in Jalisco, by Sr. Trinidad Garcia.

Under charge of Sr. Edwardo Martinez Baca, commissioner for the Mines Department, this large exhibit has been carefully and systematically arranged, the object being to give visitors a general idea of the great variety and extent of the mining resources of Mexico; and at the same time to enable those who are specially interested, either on the industrial or the scientific side, to study the exhibits with ease, and without confusion.

The great mining belts of Mexico are found in the mountain ranges which traverse the country from north to south; in the branches and foothills of those ranges, and in the lesser sierras. The exhibits of the various States have been so placed as to follow this general geographical order, beginning with Lower California, Sonora and Chihuahua on the north and going gradually southward—distinguishing between the States on the Gulf and the Pacific coasts—to Tobasco and Chiapas in the extreme south. Each State shows ores and products which are now being actually exploited, as well as others which are open to working in the future. A few exceptions were necessarily made in the case of some large special exhibits; but in the main the general classification has been closely followed, as visitors will readily find. Much credit is due to those in charge for the work they have done, and for the thoughtful courtesy shown to interested visitors.

While silver and lead form the leading exhibits, as we have said, gold has also considerable prominence among the ores and finished products shown.

Copper is well represented in the exhibits of the Boleo, the Moctezuma, the Greene Consolidated and the Cananea Consolidated companies, which are referred to below. These companies also have sample copper ingots, bars, matte and metal in various stages.

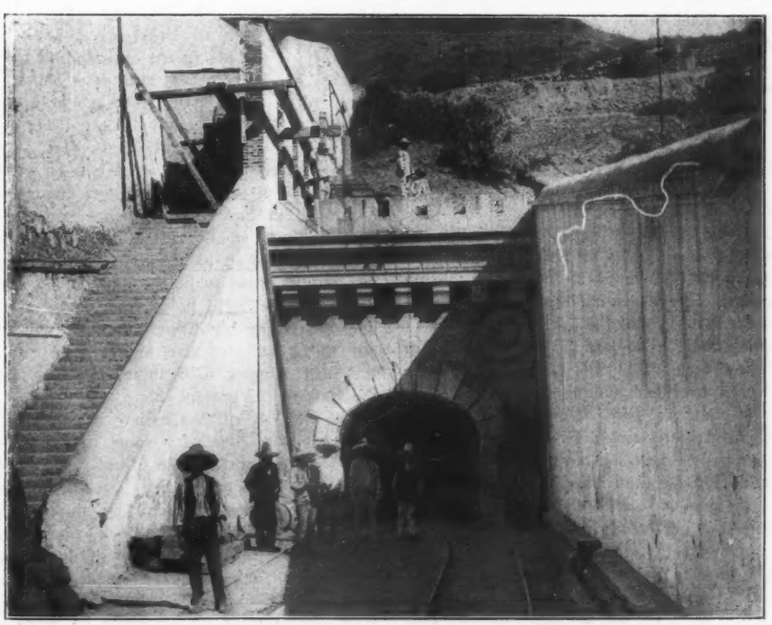
The Compania Fundidora de Hierro y Acero, of Monterey, has fine samples of bars, rails, angles, beams, castings and other iron and steel products. Iron ores are shown from Durango, Hidalgo and some other States.

The coal exhibits are all from Coahuila, and are made by the Compania de Carbonifera de Fuente and the Mexican Coal & Coke Company; the latter having a block of coal weighing 3,500 kg., from Las Esperanzas.

A large number of maps, plans and photographs are included. Prominent among these is the display made by the Geologic Institute of Mexico, which is in a special pavilion. These photographs and sections possess much interest from a scientific point of view and deserve careful study. They are supplemented by a fine collection of specimens of ores, rocks and minerals of different kinds. In this pavilion also are copies of the various papers and monographs published by the Institute.

Another excellent collection of maps is shown by the State of Oaxaca. The Junta de Mineros de Taxco, in Guerrero, has a fine display of photographs. Among the mining companies making similar exhibits are the Real del Monte, the Santa Gertrudis y Guadalupe and the Cananea Consolidated Copper comcepcion del Oro, in Zacatecas; the Penon Blanco, in San Luis Potosi; the Moctezuma, at Nacozari, in Sonora; and the Boleo, in Lower California.

A joint exhibit, by the Greene Consolidated and the Cananea Consolidated Copper companies, finds place in a special pavilion, so designed and arranged as to be in harmony with the general design of the Mexican section. It includes a complete series of specimens surface ores and the ores obtained from the companies' mines at different levels; also the character of the vein walls and gangue. There are also examples of special minerals found in various portions of the mines. All of the specimens are carefully labeled, and are so arranged that, by reference to the maps on the walls, the point from which each one came can be readily determined, and a good idea obtained of the formation in which they are found. There are also arranged in proper order, samples of ores and concentrates from the smelter bins, of the fluxing materials and coke used, and of the flue-dust collected in the large dust-chambers recently erected in connection with the furnaces. The samples from the concentrates are accompanied by a flow-sheet—a copy of which was published in the'



ENTRANCE TO ADIT, SAN RAFAEL MINE, PACHUCA.

JOURNAL for June 30 last—placed conveniently. There are also a number of photographs showing the property, mines and mills. Maps show the general topography of Cananea and the surrounding country. Finally there are mine sections built up of glass, showing the Veta Grande and Capote mines, with their various levels. Very little additional could be suggested, the exhibit being so designed and arranged as to give the visitor a complete idea of the company's property.

PYRRHOTITE AS A SOURCE OF SULPHUR.

According to Ernst A. Sjöstedt, in a paper read before the Canadian Mining Institute, March, 1904, the manufacture of sulphuric acid from pyrrhotite has been successfully accomplished at Sault Ste. Marie. The ore (from Sudbury) contains 15 to 20 per cent sulphur, 1 to 3 per cent nickel, and 0.5 to 2 per cent copper. The ore is sorted into two classes, one high in copper and low in sulphur, the other low in copper and high in sulphur. The former is smelted to matte in the ordinary way; the latter is sent to the acid plant. It averages about 28 per cent S, 3 per cent Ni, 0.5 per cent Cu and 50 per cent Fe. The roasting is done in a modification of the Herreshoff furnace, the external cylindrical form being abandoned and four shafts constructed in a block, loss of heat by radiation being thus reduced. In this way, and with other means to conserve heat, designed in accordance with good engineering practice, satisfactory results have been obtained. The furnaces are constructed in muffle-form, arranged for gas-firing, but improvements in the details and increase in experience enabled that to be dispensed with, and ore as low as 20 to 25 per cent S has been burned down to 1 to 3 per cent S, producing a gas with 6 to 10 per cent SO_2, without the use of any extraneous fuel. The plant comprises four blocks of kilns with an aggregate capacity of 40 tons of ore per day, and up to the time of writing had burned 10,000 tons of pyrrhotite and 3,000 tons of pyrites. The experience is very valuable, showing how a poor sulphur ore can be almost completely burned without extraneous fuel when proper means are taken to avoid loss of heat in excess air, by radiation and otherwise.

QUICKSILVER MINES IN PERU.—In a recent bulletin issued by the *Cuerpo del Ingenieros de Minas del Peru*, Augusto F. Umlauff gives an interesting account of the ancient quicksilver mines of Huancavelica. The mines were discovered in 1566, and during their long career have made an estimated output of 1,116,235 quintals (55,800 metric tons) of quicksilver. The last period of successful operation was from 1846 to 1849, when the production averaged 20 quintals per week. The ore is cinnabar and occurs in veins and stockworks intersecting a series of sedimentary rocks, mostly limestone, sandstone and quartzite, and as disseminated masses along the contact of igneous intrusions. Altogether the deposits can be traced from Chunamachay on the northwest to San Antonio on the southeast, a distance of several kilometers, although not in a continuous line. Samples taken by the writer from the old workings indicate that the ore runs about 2 per cent quicksilver. Beside the ore-bodies still remaining in the mines there are several heaps of waste and spent ore, aggregating 150,000 tons, which average 0.1 per cent metal. The mines are situated 458 km. by wagon road from the port of Callao at an elevation of 14,000 ft. above sea-level.

THE NICKEL MINES OF NORTHERN ONTARIO.

BY OUR SPECIAL CORRESPONDENT.

It may seem rather strange that general interest and activity in nickel mining in northern Ontario should be at such a low ebb this season while the output of the mines is larger than in any previous year. But the explanation of this unusual state of things in mining is simple enough. In the first place, the whole nickel belt has been thoroughly explored of late years, without a single new discovery of any importance having been made, and no prospecting for nickel mines is being done here any more. The second cause is said here to be due to the manipulations of the Nickel Trust. And yet, after all, the main reason is probably to be found in the fact that in Canada, as in the United States, it is most impossible to enlist capital in any new mining enterprise during a presidential year, and more especially in the present case, as the financial scare of 1903 still affects the investing public on both sides of the international line.

The increased output of the mines this year is owing entirely to one exceptional circumstance, which is not of a permanent or lasting nature. Formerly, quite a number of comparatively small mines were actively worked by the Canadian Copper Company, but most of them were closed down two years ago, and the mining operations of this company have since then been confined to the big Creighton mine and two of the smaller ones. The output of the Creighton mine alone is nearly 1,000 tons of ore a day. Nevertheless, this mine is far from being the wonderful bonanza it is supposed to be, and the claim that is made by the Nickel Trust and its friends, that this mine will control the nickel industry of northern Ontario for the next 20 years, in a district that has over 50 workable ore deposits in it, is not worthy of credit. The Creighton mine is undoubtedly a very large and valuable body of nickel ore, but, like the majority, if not all, of the other mines of the district, it is irregular, and very much intersected and broken up by dikes of granite, diabase and other country rock. The open cut so far worked is the best part of the surface outcrop, and the deeper it is worked the more rock comes in. In short, the opinion expressed in this correspondence some years ago, that the smaller mines of the Sudbury nickel belt, being as a rule of higher grade ore, would prove to be the best paying mines of the district, still holds true. It is even a question if the big Creighton mine will turn out to be as profitable in the long run as the little Copper Cliff mine has been from the start to the present day.

The old cry of "no money in nickel mining" has been dead for some time, and the last annual report of the Mond Nickel Company, for 1903, has buried it. The payment of a 7 per cent dividend by this English company on its preferred stock, when working only one mine of medium grade ore, and running but one ordinary smelting furnace, with a very expensive office and managing staff, shows what money could be made out of some of these nickel mines.

The large new plant of the International Nickel Company was completed several weeks ago, but a part of the machinery was found to be too weak for the work required of it, and the company had to shut down the bessemerizing department and continue to use that of the Mond Nickel Company until the necessary repairs are made. But even then it remains to be seen whether the large 500-ton furnaces of the new plant are as well adapted for the treatment of these peculiar nickel ores as the old 100-ton smelters used in the past.

After spending three seasons and considerable money trying to locate hidden nickel mines in the Sudbury district with the dip needle, the Edison men have given up the hopeless task and gone home. It would have been wiser to have bought mines that are visible to the naked eye. In this connection there is a good joke which verifies the old saying that 'he laughs best who laughs last.' The young college students sent out by the Edison Company the first year used to poke fun at the old local prospectors for allowing them to come and find what they called "the best mines in the district." But where they found the highest readings with the needle the diamond drill could find no nickel ore, and the old-timers now have their chuckle over it.

A second payment of $15,000 has recently been made on the Ross property, in the township of Levack, by the Milwaukee syndicate that bonded it last year, and the sale is sure to be carried through now. But development work on the mine has been suspended for some months. R. J. Tongh has a small prospecting gang doing the required assessment work on some of his nickel claims on the north range. The Mond Nickel Company is exploiting the North Star mine this season, in a more systematic and intelligent way. The engineer who took charge of the work last spring is said to be a very capable and practical man. Over 2,000 tons of high-grade ore is taken out of the first level of this mine every month. The shaft is down less than 150 ft. yet.

No mining region could be better supplied with both wood and water than the Ontario nickel field is, in all parts of it. But the cost of getting the wood cut and taken to the mines is increasing every year, and at last some of the fine water powers that have been going to waste on the Vermillion and Spanish rivers, are likely to be utilized in supplying power to the mines and smelting works. In one case the power will be conveyed by electric cable for more than thirty miles through the bush.

Prof. A. P. Coleman, of the School of Practical Science, Toronto, and mining geologist for the Ontario government, has been making special investigations of the Sudbury nickel deposits for some years. His theories and conclusions are very plausible, but must be proved by actual mining operations on a great scale. He has been visiting some parts of the district this season in company with Mr. Thos. W. Gibson, the able and hard working director of the Ontario Bureau of Mines.

WATER REQUIRED FOR GAS ENGINES.—According to the *Engineer*, the quantity of water required at the ordinary temperature of 60° F. inlet, and 150° outlet, to keep the cylinders of gas engines cool is 4.5 to 5 gal. per indicated horse-power-hour. The jacket pipe should be from 1 to 2 in. diameter for engines up to 20 h.p., while for larger engines the sizes are generally 2 to 3 in. for the inlet and 2.5 to 3.5 in. for the outlet. Tanks for circulating the water are generally made with a capacity for furnishing 20 to 30 gal. per indicated horse-power.

THE AMERICAN MINING CONGRESS.

The session was opened on the morning of Monday, August 22. The president, Mr. J. H. Richards, presided. Addresses of welcome were delivered by the governor of the State of Oregon and the mayor of the city of Portland. Governor Chamberlain said, in part:

It affords me great pleasure to extend to you, the delegates to the American Mining Congress, on behalf of the people of Oregon, a cordial welcome to our State.

It matters not from whence you come, nor what flag floats over you when at home, the genial breezes of Oregon are balmy enough, the homes of our people hospitable enough, and the hearts of our citizens warm enough to insure each and every one of you a hearty reception and a pleasant stay among us.

Oregon feels that in honoring you she is honoring herself, for it is seldom indeed that any State has an opportunity to welcome as her guests a body of men so distinguished, not only in the fields of commercial and industrial enterprise and activity, but as well in governmental affairs of State and nation.

You have assembled here to consider problems affecting one of the greatest industries of our country, and to take steps looking to its advancement. It is well that to the settlement of these problems and the promotion of an industry so vital to the welfare of the world you have invited none but men who have achieved distinction in the various activities to which each has bent the best energies of his life.

It is unfortunate that an industry of such vast importance to national and international commerce, and so magnificent in promise as the mining industry, has received too little attention at the hands of the lawmakers of State and nation. What has been heretofore accomplished has been due to individual enterprise and effort.

And first, you should make your voices heard in the halls of Congress. An industry of such importance to the world as is that which you have the honor to represent should have a place in the cabinet of the President.

And, second, there should be State recognition of the mining industry. Here, too, is a field open for your combined effort and enterprise. A bureau established with proper safeguards and restrictions so that it would be for the benefit of a class engaged in exploiting the rich resources of the State, and not for an individual whose sole aim and ambition is to draw a munificent salary, would do much to elevate, promote and stimulate the mining industry.

The venerable mayor, Mr. George H. Williams, said, in part:

When we speak of the Congress of the United States we understand that it is a body of representatives from all parts of the American union assembled to make laws, and when we speak of the American Mining Congress we understand it to be a body of representatives from all parts of the same union assembled to consider an industry in which all of the people of the United States are more or less interested. To constitute what may properly be called a congress, a body assuming that name should have a national character.

Mining is the chief cornerstone of the business world. It is as much the foundation of our manufacturing industries as the earth is the foundation of the structures in which those industries are conducted. Mining products in the various forms and agencies into which they have been converted have done more for the advancement of trade and commerce than all other causes combined. Without iron, coal and copper as the basis of commercial appliances our transportation by land would go back to the pioneer days of pack mules and our transportation by water to the pettiness of the Indian canoe. Without iron there could be no steel, and without steel the machinery of our factories would be on a grade with the old-fashioned New England looms. Railroads, telegraphs and telephones would be impossible if there were no iron, steel or copper to be employed in their construction and use.

Portland feels flattered and honored by your meeting here. We are pleased to have with us so many representative men from all parts of our great country. We feel a deep interest in the subjects you will have to consider. Mining is one of the leading industries of Oregon. I am here to welcome you to this city. Whatever is good here, we want you to have, and whatever is beautiful here we want you to see.

Responses were made by Messrs. James T. Small, of Maine; James E. Talmage, of Utah; Z. Lamar Cobb, of Texas, and J. T. Cornforth, of Alaska. In the afternoon Mr. Richards gave his presidential address, which will be found on another page; it was followed with keen interest. Mr. W. D. Fenton gave an account of the Lewis & Clarke Exposition, and then Mr. Harvey W. Scott, editor of the Portland *Oregonian* and a pioneer of Oregon, made an interesting address on the relation of the mining industry to the development of the country. He referred at length to the growth of the mineral production of the country, and to the extent to which the United States supplies the world with copper, petroleum, iron and steel, and other products. He also referred to the large number of persons employed in the industry, to its importance, to the transportation industries and to the great growth of the application of power and machinery to mining. In conclusion he characterized the mining industry as the greatest of all factors in the progress of the human race. "For, of the infinite development that has transformed all human society, it is the principal agent and main support. It not only supports itself, but it stimulates every other energy. It is the main agency, which has produced that infinite variation which gives to modern life the character that so distinguishes it from the life of the earlier time."

Secretary Mahon announced the appointment of the following committees, selected by the board of directors:

Resolutions—E. R. Buckley, Rolla, Mo., chairman; J. E. Talmage, Utah; E. G. Reinert, Colorado; Thomas Ewing, California; J. Frank Watson, Oregon; C. L. Dignowity, Pennsylvania; J. T. Small, Maine; J. W. Malcolmson, El Paso, Tex.; C. C. Hamlin, Colorado; F. Wallace White, Ohio; F. V. Drake, Oregon; E. H. Haworth, Kansas; O. W. Powers, Utah; J. F. Callbreath, Colorado; Maurice D. Leehey, Washington; James H. Lynch, Montana; G. W. Dorsey, Nebraska; T. A. Rickard, New York; Eugene B. Braden, Montana; S. F. Emmons, Washington, D. C.

Credentials—Philip S. Bates, Oregon, chairman; M. P. Gilbert, California; R. C. Patterson, Nebraska.

On Tuesday morning Messrs. F. H. Newell and Gifford Pinchot, of Washington, explained the purposes of the commission appointed to investigate the condition of public lands, the first speaker dealing with irrigation and the second with forestry.

Mr. F. H. Newell asked the Congress to formulate for the benefit of the public lands commission suggestions as to whether or not changes are desired in the law of apex. The presence of the commissioners here, he said, was to gain ideas from the delegates as to what the miners desired, and the extra-lateral right, so-called, being one of greatest concern to mining operators, expressions are much desired. "Irrigation and mining are intimately related," he said. "Some of the highest irrigation development in the United States is located where hydraulic flumes of early mining days have been converted into canals for agricultural and horticultural areas."

Mr. Gifford Pinchot, forester of the United States, informed the convention that President Roosevelt's idea is that public lands should be devoted to the best possible use, and the object of the commission is to ascertain what is the best purpose to which lands may be devoted. Mr. Pinchot portrayed in an interesting way the difference in the wishes of the lumbering, livestock and mining industries with regard to public lands, water rights, etc.

Mr. J. H. Mitchell, senator for Oregon, followed with an explanation of the needs of a government branch mint or assay office at Portland. Mr. M. L. Leehey, of Seattle, spoke on that important subject, "the Mining Law." At the afternoon session Mr. Frank V. Drake, of Portland, described the mineral resources of his own State, and Mr. T. A. Rickard, of New York, addressed the Congress briefly. The most important feature of the proceedings was the passage by unanimous vote of the resolution representing the fundamental aim of the Congress; it stood in the name of the president, Mr Richards, and read:

Whereas, The settlement of our vast public domain under the direction of the Department of the Interior has of itself more than justified the creation of this department of our government; and

Whereas, The benefits already received by the people of the United States, through the influence of the Department of Agriculture, demonstrate the wisdom of establishing this department as one of the great executive branches of our government; and

Whereas, The Department of Commerce and Labor is constantly presenting conclusive evidence of the usefulness of such a department in wisely directing the great interests coming within its jurisdiction; and

Whereas, The successive establishment of these departments of our government (at the different stages of economic development of the United States) has fully demonstrated the usefulness of this manner of co-operation by our government in meeting the ever expanding industrial needs of the people; and

Whereas, The mining development of this country if wisely directed, will add a much needed element of permanency and stability to present industrial progress; therefore, be it

"*Resolved*, That the American Mining Congress, in annual session assembled, believing the time has arrived when a department of mines and metallurgy would be the means of placing the mining industry on a plane commensurate with its importance to all industrial progress, urges the Congress of the United States at once to create a department of mines and mining as one of the great executive branches of our government."

The resolution protesting against the ruling

of the Secretary of the Interior on the Teller law was made a special order of business for the first committee meeting to be held the next day. A resolution praising the action of the post-office inspectors was introduced by Mr. T. A. Rickard, one of the delegates-at-large appointed by President Roosevelt, as follows:

"Whereas, This Congress earnestly desires to see the business of mining placed on a sound basis; therefore, be it

"Resolved, That this Congress record its appreciation of the successful efforts of the Postoffice Department of the national government in preventing the misuse of the mails for fraudulent mining schemes."

A resolution was carried making selection of permanent headquarters a special order for Thursday afternoon at 2 o'clock.

The following resolution was adopted at the night session:

Whereas, The great majority of mines cannot be operated without timber, and their output of ore is limited by the available timber supply; and

Whereas, Forest reserves are by law open to prospecting, locating, and development of mines, as other public lands, with the single exception that large users of timber must pay a reasonable government charge therefor; and

Whereas, The cutting and export of timber from mineral regions by large corporations constitute a serious menace to the mining industry; and

Whereas, The Department of Agriculture has given special attention to the question of timber supply for mining and other purposes, and is the only government department equipped to deal with all the varied, far-reaching, and important problems involved in the continuous production of timber from the soil; therefore, be it

"Resolved, That the American Mining Congress heartily favors the conservative use of forest resources, whether in public or private hands, and in particular the creation and management of forest reserves under practical, business-like rules and regulations, to the end that local timber supplies may be maintained for mining and other uses;

"Resolved, That in the interest of the mining industry, to which timber and water alike are essential, the care and management of all government forest reserves, except as to titles, should be transferred from the general land office to the United States Department of Agriculture, in accordance with the recommendations of the President, the Secretary of the Interior and the Commissioner of the General Land Office.

At the conclusion of the afternoon session the delegates visited the site of the Lewis & Clarke fair and made a trip over the tramway lines of Portland, traveling over the most interesting portions of the city.

On August 24 a resolution introduced by the Texas delegation, providing that El Paso be the next place of meeting, was adopted unanimously and then referred to the board of directors for final approval. A warm debate took place over the question of endorsing the claim of residents in Alaska for a delegate to the National Congress. The committee on resolutions had recommended that the matter be not taken up as pertaining to local politics and calculated to obscure the purposes of the Congress. However, in open meeting, this resolution was passed. In the afternoon Mr. E. R. Buckley, State Geologist of Missouri, read a thoughtful paper on 'The Functions of the Geology and Mines; he was followed by Mr. Jas. W. Abbott, of Denver, with a timely address on 'Mining Men for Better Roads.' El Paso was finally chosen by the directors as the next place of meeting and on the day following the burning question of permanent headquarters was settled by the choice of Denver.

THE PURPOSES OF THE AMERICAN MINING CONGRESS.

We give below, nearly in full, the address made by Mr. James H. Richards, the president:

Gentlemen of the Congress:

It gives me great pleasure to meet you again on this occasion of your annual session, and to say a few words of greeting to you before you enter upon your deliberations and proceed to take such action as may seem to you most appropriate for advancing the aims and purposes of our organization. It was thought by your Executive Committee that it would be fitting to make a few suggestions at this time for your consideration, in relation to a few of the aims and purposes of this Congress.

What are those aims and purposes? I need make no apology for refreshing your recollection by quoting from the charter of our corporate existence, because whenever I read those words they give me a new inspiration for our work, as well as an authoritative revelation of our opportunity: "To advance the mining and metallurgical industries in all their various branches within the United States; to assist in bringing about a more perfect co-operation between the Government of the United States and the development of mining and metallurgy; to encourage education in practical and scientific mining and the dissemination of scientific information in relation to mining, metallurgy and their allied industries; to acquire and disseminate trustworthy information bearing upon the development of the metallic and nonmetallic mining resources of the United States; to promote a more co-operative tendency in the evolution of agriculture, mining, manufacturing, transportation and commerce, and for the particular purpose of bringing the mining men of the United States into closer relations with one another, and of promoting a friendly feeling for one another through social intercourse and the discussion of mutual interests."

Therefore, if assisting in advancing the mining industry to a position commensurate with its importance; if aiding in bringing about a more perfect co-operation between the Government of the United States and the development of mining; if encouraging the application of scientific methods to all departments of mining; if promoting a more co-operative tendency in the harmonious evolution of agriculture, mining, manufacturing, transportation and commerce; if bringing representative mining men together for their mutual benefit, are worthy aims, and this Congress can materially aid in accomplishing these purposes, then it has a rightful place among the active agencies of American effort, and can, if intelligently utilized, bring richer opportunities to greater numbers of individuals, as well as insure more stability in industrial tendencies, and through these achievements confer lasting honor and advantage upon our national commonwealth.

The existence of the American Mining Congress is not a result of accident. Its existence, aims and work are intended to express the necessity for a broader co-operation, based on a closer unity of general purpose, and to aid in bringing about such changes in method as will give a more beneficent direction to present industrial tendencies.

These tendencies are at bottom co-operative, and therefore healthful. The great combinations, both of capital and labor, are simply manifestations of the development of a great principle, which must be controlled and directed so as to accomplish the greatest good for the greatest number. The abuses of this principle of co-operation, whether such abuses appear in the form of rapacious trusts or lawless unions, simply present conclusive evidence of weakness in our present industrial and financial methods. We cannot afford to allow predatory promoters to rob the people of millions by the issue of watered stock on consolidated industrial plants, nor can we tolerate a state of civil war between mammoth aggregations of capital and labor. The common people who are non-combatants in these conflicts also have rights which can and must be maintained.

But notwithstanding all these abuses, the tendency to combine marches steadily on, and it would be just as sensible to talk of damming the Mississippi river to get rid of the floods, as to advocate reversing these wheels of progress and restoring the conditions of the past. The tendency may and must be guided; it must be restrained; it must be kept in proper channels, and it must be inspired with justice. Then finally it will be seen to be what I have called it—a co-operative tendency, by which all should benefit, inasmuch as it is better to work together than to work apart, better to work in harmony than to work in strife.

I say, therefore, that if a wiser direction were given to these tendencies, greater opportunities for individual and local growth would arise, investments in our vast industrial ventures would be safer and more permanent, the dangers and losses from financial and industrial panics would be minimized, the employment of labor would become more regular, and the remuneration of both labor and capital more certain. In other words, a more general unity of purpose in these tendencies would result. As mining largely finds a market for its products through our industrial and transportation development, if that market were less fluctuating on account of alternating periods of depression, the mining industry also would present a more attractive field for legitimate investment, and be to a less extent the sport of a merely speculative activity.

Now, since these defects in our present business tendencies exist, there must necessarily be ways and means of bringing about more satisfactory conditions. Can the American Mining Congress be made a useful and potent factor in American effort to reap most successfully the fruit of American opportunity? We say that it can.

In the first place we want to enlist the active powers of the National Government more fully in this work of striving for better industrial conditions. We have seen what our government has already done in the way of directing its activities into channels which are wholly non-political, as that term is generally used, but which have a most vital connection with the economic welfare of the people. We have seen how our government has beneficially molded the process of settlement of the people's heritage, our vast public domain, by the institution of the Interior Department about the middle of the last century. We have seen its

benign and directing influence upon agriculture through the creation of the Department of Agriculture a comparatively few years ago. We have seen the effective work already accomplished by the new Department of Commerce and Labor during the few brief months of its existence. The successive establishment of these industrial departments of our government at different stages of the economic development of the United States is most significant. The people need these industrial departments; they need this active and intelligent co-operation of their government in matters which are vital to their happiness and prosperity.

So it is becoming more and more a conviction with many that the government which meets the fullest measure of its responsibility to the citizen is the one which most wisely aids in directing the industrial upbuilding of its people, not in a paternal sense, but in a co-operative sense, and to the end that there may be more unity of purpose in working out methods that will assure the greatest possible stability to the investment of capital and the employment of labor, while preserving the independence and individual opportunity of the average man.

We stand at the portals of glorious possibilities. Our country, by reason of the mechanical genius of our workmen, the executive ability of our captains of industry and the almost unlimited abundance of cheap raw material, rather than by reason of any marked co-operation on the part of our government in the past, has taken a leading position among the great industrial nations. Our governmental theory has been: Equal rights, equal duties and equal laws, then let the man do the rest. But conditions are changing. The rivalry of nations is becoming conspicuously an industrial rivalry. International competition is to-day more intense than ever before, because the nations of the earth are brought so much closer together by modern facilities of communication. Careful observers are warning us that the highly perfected bureaucratic organizations of European governments are being more and more utilized in fields of industrial activity. That nation which is powerful industrially can always buy guns and ships, employ big armies to win its battles, and easily float loans to pay for them. We found that out in our own Civil War. But if you have no powerful and organized reserve of national resource back of your military display, your army and navy are liable to collapse like a house of cards when the hour of crucial strain arrives. And so we say that the United States must be better prepared than ever before to meet the influences of these mighty governmental organizations in seeking the trade of the world. How shall it do this? Simply by more effectively directing the industrial energies of its people, by opening new avenues for industrial enterprise, and by making it possible to secure better results in the old.

We have already, as I have intimated, made creditable progress in that direction. If the Agricultural Department of our government has broadened the markets for farm products in all parts of the world by systematic effort; if it has diffused much needed scientific information concerning crops, soils and tillage; if it has effectively assisted the cultivator in overcoming the pests that endanger his crops; if it has helped to make agriculture more like a business calling by securing results which are more calculable and rewards which are more certain; if it has thereby invested agriculture with a new dignity and brought a greater measure of comfort and prosperity to the producers of agricultural products, then to that extent our government has met the fuller measure of its responsibility, due to changing economic conditions, by the establishment of the Department of Agriculture at Washington.

On the other hand, if we inquire what governmental co-operation can do for the great primary industry of mining, you will find a singular parallelism with what it has so effectively done for the great primary industry of agriculture. Why? Because both these industries are producers of raw material, because taken together they supply nearly all the raw material used in our arts and manufactures, and therefore any discrimination against either must react upon all the industries and occupations which are dependent upon it. This is why we contend that the reason and justification for governmental co-operation in the one case is practically the same as in the other.

We therefore affirm that if a Department of Mines and Mining could broaden the markets for the products of our mines by intelligent investigation and official action; if it could diffuse among prospectors and miners in practical form the scientific information which would be so useful to them; if it could afford them cheap and perfectly reliable facilities for classifying and assaying the infinite variety of ores found in our extensive mineral districts; if through a revised, simplified and uniform system of mining laws and a judicious control of mining corporations in the interests of the working miner, the investor and the general public, it could lessen that element of friction and speculation which to-day in the opinion of so many condemns mining both as an occupation and an investment—if through such a department such results could be accomplished, then it must be apparent to all that such accomplishment would create a new atmosphere and a new hope, not only throughout the mining world, but that the salutary effects would re-act in the commercial and industrial world, and that every railroad office, every bank, every factory and every farm would feel the stimulus and reap the benefit.

In all the objections which I have ever heard or read against a Department of Mines and Mining, I have never been able to discover even an attempt to answer this query: Why has not the prospector, the miner and the investor in mines just as good a right to governmental co-operation as the farmer, the horticulturist and the investor in farm mortgages? We contend that mining, as a leading department of primary production, is just as essential to civilization as agriculture. The wheels of industry could not make a single revolution without the products of the mine. But we are not asking our government to assume the paternal or patronizing attitude towards the mining industry. We are not teasing it to make us any presents, but we are asking it to work with us. In this country the government is the people, and the people are the government; it is of them and for them. That is the doctrine when reduced to its lowest terms, and it is the only theory upon which I am making these remarks. But conditions change, and human effort and agencies must change with them. "New occasions make new duties," is as true of governments as of men. We want to preserve the individuality of the American citizen, we want to preserve the better opening, the better chance in life which has been characteristic of this country in the past. To that end we must have governmental agencies that recognize the changed conditions and are equipped to meet them—governmental agencies which apply the co-operative principle in dealing with the citizens by whom they are maintained.

The Interior Department, by the aid of wise law, is approaching the end of its mission, so far as the equitable distribution of our public domain is concerned; it has done that work well; it has made homes for a new sisterhood of States; it has kept open a resource of independent livelihood for the poor man. The Department of Agriculture has supplemented its efforts, has enhanced the value of our agricultural products by untold millions, and has found a permanent place in our governmental activity. A Department of Mines and Mining must logically follow. The mining industry could then speak through this Congress in its endeavor to co-operate with the government in making the mining industry one of the strongest bulwarks of our industrial fortress. This great primary industry of mining must also feel the uplift of the co-operative tendency of the age.

Recognizing the great service our government has heretofore rendered the mining industry, especially through the work of that branch of the public service known as the United States Geological Survey, we still feel sure that much more efficient service would result through such a department, and at the same time afford the Geological Survey, splendid as its services have been in the past, an opportunity to make one branch of its work more definite, extensive and permanent. Its reports would thereby become much more authoritative and attractive. The commercial value of such reports as pertain to mining would be greatly enhanced. The work of the Geological Survey would be more highly recognized, and its influence would be immeasurably extended through such a department. The systematic and scientific development of the great mineral sections of our country are second only in importance to our agricultural section, each, however, stimulating the other, and a very large part of the effective work of this development as well as its encouragement, must necessarily rest with the Geological Survey. It therefore becomes apparent what a directing influence over such a department the Geological Survey would possess. And it would give a much more direct, positive and influential character to this branch of our public service, and greatly to the advantage of the mining industry at large. Too much importance cannot be attached to the influence such a department would have, in enlarging the scope, making at least one branch of the work more valuable, and enlarging the influence of the United States Geological Survey, and every man connected with this branch of our public service should rejoice in the hope that a Department of Mines and Mining will be early established.

If there are substantial reasons for the institution of such a department, then a general demand therefor should be made, and it should be based on arguments clear enough, expressed in terms strong enough, to be heard at Washington.

But if the American Mining Congress is to be what its purposes and opportunity justify, it must rest on a higher and more permanent business basis than heretofore. The blessings which have resulted from its labors are many, but it still lacks that inherent force which commands the highest respect and attention. If it is to successfully meet the challenge of its opportunity it must be placed on a thoroughly business basis, both as regards finances and as regards management, such as will assure it the approval of the best business thought of the

day. There must be added unto it that element of permanency as an institution which begets pride in and respect for what it represents. It must be so impressed with the elements of successful effort, stability, influence, and power to serve, that it will be both feared and respected. It must rest on a financial foundation which will obviate the necessity of asking for charity in order to perform its functions. Permanent headquarters must be established, suitably equipped to carry on the work of the Congress between sessions, and this will be one of the most important questions for you to consider at this meeting. As an incident to permanent headquarters, employees must be chosen who are competent to do this work, and adequate compensation must be provided for them. One of the features of a permanent home, which alone will justify its establishment, should be a mineral collection. I do not mean an ordinary mineral collection, but such a collection as our organization ought to acquire, and which its members are in a position to acquire by a little personal effort at a minimum of expense; that is to say, the finest and most practical working collection of minerals in the world. This collection would be classified and properly cared for at the permanent home, and constantly augmented. The American Mining Congress should possess the national mineral collection par excellence, one worthy in every way of the great mining industry of America.

I suggest these things, well knowing that their consummation must be the mature fruition of many sessions of this Congress, but at the same time with the desire that we may have these ideals in our thoughts as members of this organization, and work steadily toward their gradual fulfilment.

In conclusion, gentlemen of the Congress, I take this opportunity to gratefully acknowledge my appreciation of the trust you have reposed in my keeping during the two years past. I assure you that I deeply feel and shall always remember the cordial support and generous consideration which you have uniformly shown me, and sincerely hope that my efforts to strengthen and perpetuate the American Mining Congress may in some small measure justify the honor you have conferred.

IMPROVEMENT OF ZINC FOR GALVANIZING.—Messrs. P. and A. Gührs state in British patent No. 12,186 of 1903 that the addition of about 0.5 per cent of aluminum and 0.2 per cent of bismuth to spelter for use in galvanizing causes the coating to have a peculiarly brilliant appearance, and prevents the formation of hard zinc and zinc oxide in the bath. The aluminum and bismuth are added in the form of an alloy prepared by melting in a crucible about 20 parts of aluminum, 20 parts of zinc and 5 parts of bismuth, casting in bars for use in the galvanizing bath.

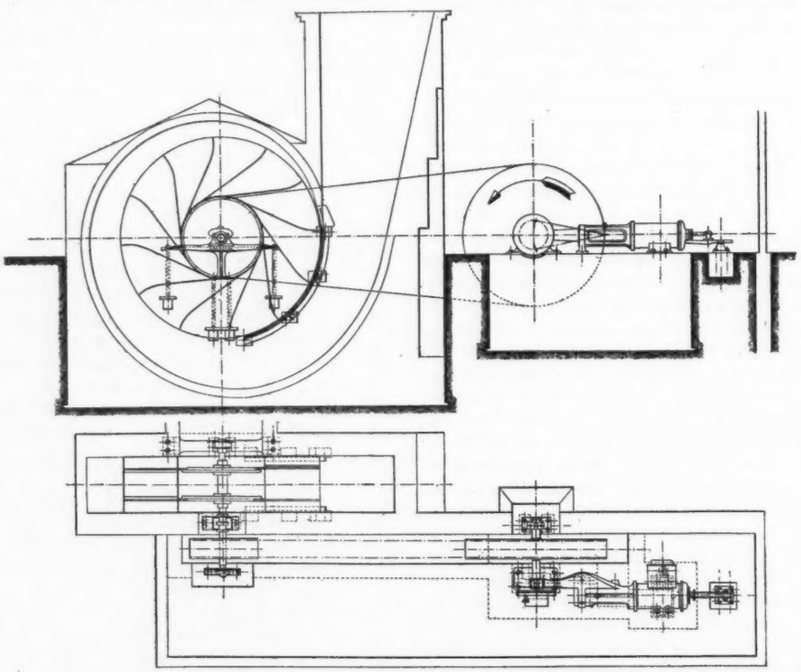
PRODUCTION OF ABRASIVES.—The total output of abrasive materials in the United States in 1903 was valued at $1,493,303, against $1,326,755 in 1902. According to Mr. Joseph Hyde Pratt, under whose direction these statistics were compiled, the total was divided among the different products as follows: Oilstones and scythe-stones, $366,857; grindstones, $721,446; buhrstones and millstones, $52,552; pumice, $2,655; infusorial earth and tripoli, $76,273; crystalline quartz, $76,908; garnet, $132,500; corundum and emery, $64,102. The output in 1903 was the largest on record.

A GUIBAL FAN WITH VOLUTE CASING.*

By E. LAGAGE.

The ventilating fans at No. 2 workings of the Charbonnages de Fontaine l'Eveque having proved unsatisfactory, it was decided to install a Guibal fan with volute casing. To determine the principal dimensions of this fan the method of Emile Gosseries was employed. The data are: Diameter of fan, 6.4 m. (20.8 ft.); diameter of inlet, 2.7 m. (8.8 ft.); width of fan, 1.8 m. (5.9 ft.); revolutions per minute, 107; equivalent orifice of the mine, 1.55 sq. m. (16.68 sq. ft.); manometric depression, 100 m.m. (3.94 in.); volume of air per second, 50 cu. m. (1.766 cu. ft.); work of ventilation, 66 h. p.; mechanical efficiency (supposed), 60 per cent; motive power, 110 horsepower.

In drawing the volute, Q being the duty per second, V^1 the peripheral speed, and C a coefficient varying from 2.5 to 3, the maximum section S equals $C(Q \div V')$ and a given section S^1 equals $S(\theta \div 360°)$, ^{1} being the angle made by the radius vector passing through the intitial point of the volute with that passing through the section considered. In the cut the measurements are given in millimeters.



GUIBAL FAN AND ENGINE, FONTAINE L'EVEQUE.

The fan is connected by a rope drive to a single-cylinder engine, having a cut-off varied by hand. These dimensions are stroke, 0.9 m. (35.4 in.); diameter of cylinder, 0.6 m. (23.6 in.); diameter of the piston rod, 0.09 m. (3.5 in.); diameter of driving pulley, 4.5 m. (14.76 ft.); diameter of driven pulley, 2.25 m. (7.38 ft.). This engine has been run at maximum load without shocks and without heating the bearings, while the indicator diagrams showed high efficiency.

In spite of the volute casing, the shutter of the ordinary Guibal fan was retained and the most favorable position for the shutter was determined experimentally, the engine being run at a constant speed of 50 revolutions per minute, the fan making 100. The volume of air passed, cubic meters per second, was: At the bottom, 49,973 cu. m.; lifted 0.4 m., 53,218 cu. m.; lifted 0.8 m., 48,675 cu. m. The cross section of the air-way was divided into 36 equal rectangles, and each test was made for 60 seconds in the central rectangle. The results show that with the shutter raised 0.4 m. the maximum output of air is obtained for the same number of revolutions in the same time. The efficiency of the fan was next tested and the results carefully tabulated. Six tests at speeds of 92 to 144 revolutions were made, the indicated h. p. varying from 71.6 to 237.6. The air-way was 5.9 sq. m. in cross section. The speed of the air was 7.4 to 11.4 m. per second, the volume 43.807 to 67.170 cu. m. per second and the observed water gauge 83 m.m. (3.6 in.) to 197 m.m. (7.78 in.). The horse power in the air was from 48.5 to 170 h. p., giving a mechanical efficiency for the fan of 67.7 to 71.1 per cent, and an average manometric efficiency of 0.715, the limits being 0.7 and 0.74. The equivalent orifice was 1.82 sq. m. (19.68 sq. ft.). The tests have been repeated a great number of times, and the first results have always been largely reached.

The conclusion is that the Guibal fan, thus modified, can stand comparison with the best ventilating fans known, for its return in useful effect and in manometric efficiency.

To determine the effect of the shutter on the useful effect the fan was run at a constant speed, about 100 revolutions, and the shutter raised 0.4 m. (15.7 in.) at each test. Twelve tests were made. With the shutter at the bottom the useful effect was 69.5 per cent; raised 0.4 m. (15.7 in.) 68.5 per cent; raised 0.8 m. (31.5 in.) 65.7 per cent; and the efficiency fell off pretty steadily thereafter, being but 55.4 per cent with the shutter raised 4.7 m. (15.4 ft.). During the first tests the fan ran in absolute silence, but the vibrations increased toward the end, and became disturbing when the shutter was completely lifted.

The results of modifying the equivalent orifice of the mine were also tabulated. Seven tests were made, the fan being run at a nearly constant speed of 100 revolutions (99 to 113).

*Translated from the *Publications* of the Society of Engineers of the Provincial School of Industry and Mines at Hainaut, Belgium, 1904, *Revue Universelle des Mines*, July, 1904.

The equivalent orifice, 1.11 sq. m. in the first test, was gradually increased by several means to 2.67 in the seventh. The mechanical efficiency in the first test, when the equivalent orifice was 1.11 sq. m., was 50.7 per cent; in the fifth test, with an equivalent orifice of 1.86, it was 69.1, and in the seventh, with an equivalent orifice of 2.07 sq. m., it was 71.7 per cent. In these tests the mechanical efficiency $= \frac{t}{T}$; t equalling the h. p. in the air and T the indicated h. p. of the engine. The manometric efficiency $= \frac{h}{\frac{p\,u^2}{g}}$; h being the observed water gauge, and u the tangential velocity in meters per second.

It was thus established that the mechanical efficiency diminishes sensibly when the equivalent orifice is reduced while the manometric efficiency varies in very slight proportion. These results prove this fan especially suited for large mines, but it does not follow that the scheme would not apply to mines with smaller openings; it would simply be necessary to determine the dimensions of the fan (diameter, width and volute) in connection with the orifice under consideration.

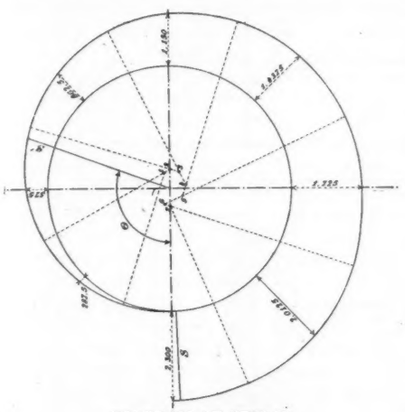


DIAGRAM OF SPIRAL.

An important colliery in the Pas-de-Calais has adopted the scheme, using a double inlet fan to handle 75 cu. m. (255 cu. ft.) of air per second, the mine having an equivalent orifice of 2.35 sq. m. The principal data in this case were: Diameter, 6.5 m. (21.3 ft.); width, 2 m. (6.6 ft.); speed, 115 revolutions per minute; water gauge, 145 m.m. (5.7 in.). The results were altogether satisfactory.

SULPHURIC ACID CHAMBERS.—The bottom inlet to acid chambers, which Mr. Porter discussed before the Society of Chemical Industry, in April, 1903, has been adopted at several works in Great Britain. An experimental trial at one plant showed a yield of acid in the total system 7 per cent higher with the bottom inlet to the chamber than with the old flues, and there was also a saving of niter of nearly 1 per cent, besides other advantages.

COAL PRODUCTION OF INDO-CHINA.—According to the French Colonial Office, the production and sale of coal from the Hongay mines in 1903 was as follows: Coal output, 267,333 metric tons, a decrease of 49,285 tons from 1902; briquettes manufactured, 37,877 tons; sale of coal in Indo-China, 25,815 tons; sales of coal in foreign countries, 197,664 tons; sale of briquettes in Indo-China, 51-858 tons; sale of briquettes in foreign countries, 6,841 tons.

MOLDING SAND.

By F. J. H. MERRILL.

With the constantly increasing demand for cast iron, in the complexity of modern civilization, molding sand for foundry purposes has reached a high degree of importance and has become an important article of commerce. It is mainly derived from deposits of Quaternary age, many of them having been formed or laid down, at the close of the Glacial period in the vicinity of the ice front. The material in its general characters is a quartz sand, mingled with clay, and may vary in the size of its grain according to the use to which it is put.

The finest sand, known as No. 1 in the trade, is used for castings which need a very smooth surface. These are largely required in the manufacture of stoves, locks, and castings of all kinds which are to be nickel-plated. A coarser grade of sand, classed as No. 2, is used for ordinary machinery castings, and the coarsest sand, Nos. 3 and 4, is used for the largest castings such as occur in architectural iron work and the heavier parts of large machines and engines.

In use, molding sand loses some of its strength and quality, and this loss must be made up by adding a certain proportion of new material. An important characteristic is that of slight loss through use, and this loss is said to be especially low in Hudson River sand. The exact chemical or physical character of this loss has not been accurately determined, but it has been observed that some of the molding sands of the Mississippi basin, in which the loss is high, contain a high percentage of lime.

The foundry industry in the vicinity of New York is well supplied from the valley of the Hudson river and the vicinity of the mouth of the Raritan. Further south in New Jersey, the banks of the Rancocas yield a supply of this material. In the vicinity of Albany, at Selkirk and at Delmar, are extensive deposits of very fine molding sand, which are of the greatest importance to the stove industry. The Albany sand is considered so superior for fine work of this character that it is widely in demand and is shipped to Illinois for certain stove manufacturers, at an expense of nearly $3 per ton for freight. Further south in the Hudson valley, molding sand is shipped from many points, Coxsackie, Camelot and New Hamburg being especially prominent. Deposits are also to be found at Newburg, Fishkill, Cold Spring and Peekskill, and probably exist at many other points.

In the Hudson valley the molding sand is a thin deposit varying from 10 in. to 3 ft. in depth and underlying 6 or 8 in. of surface soil, which, on account of its organic matter, is useless for foundry purposes and must be stripped off.

In removing the molding sand from a new field, the first step is to excavate and haul away the surface soil from a strip of convenient length and about 10 ft. in width, so as to permit the free entrance of a wagon. The molding sand is then removed from this strip. Then the laborer, standing on the exposed subsoil, removes the top soil from a strip about 3 ft. wide and as long as desired, throwing it down on the subsoil. A bench, or breast, of molding sand is thus laid bare, which is, in turn, excavated and hauled away and the work of stripping a new bench is again performed. As a result of this process, when the molding sand has been removed, the surface height of the field has been reduced by the thickness of this material and the farmer may re-commence agricultural operations, the original top soil being still present.

It is said that, in the areas of fine sand, after an interval of a few years a second crop of molding sand can be removed. In general, the dealer's contract with the owner is only for the removal of the molding sand. In the Hudson valley about $250 per acre is stated to be the average price paid for this privilege.

Every foundry uses more than one variety of sand and in addition to the different sizes required for different classes of work, there is used in making cores a highly refractory variety known as fire-sand, which has no binding power of its own, but is mixed with flour and water. This, for the New York district is mainly obtained from certain Cretaceous beds in New Jersey near the Raritan river.

For a large part of the United States the Hudson river molding sand is unavailable owing to the cost of transportation and local deposits are utilized.

Experience shows that deposits of this material vary in quality and size of grain and that, at many points where it is excavated for shipment, a certain amount of mixing is necessary at times to maintain a uniform product. In a given area, the proportions of sand and clay constantly vary, and also the size of the grain. Practical experience and keen powers of observation enable the men in charge of the sand banks to maintain the standards required by their customers.

It is acknowledged by foundry foremen that the standards of quality are to some extent empirical. When one grade of sand to which the moulders are accustomed is replaced by another, which is slightly different, some experimenting and loss of time is involved in adapting the new sand. Again it is stated by the sand dealers that different foundries use different grades of sand for the same class of work, custom and habit having an important influence in this choice.

As the uses of molding sand multiply, the demand for this material increases and the aid of the geologist is frequently invoked to ascertain the location of new deposits and determine their extent and quality. Many deposits hitherto ignored or forgotten are now becoming matters of commercial importance.

EMPLOYEES IN THE KRUPP STEEL WORKS.—United States Consul-General Richard Guenther, Frankfort, Germany, reports, under date of July 21, that according to the published statement of the Krupp Works the total number of persons employed by the firm on April 1, 1904, including 4,190 officials, was 45,289. Of these the cast-steel works at Essen employed 25,041, the Gruson Works at Buckau 3,329, the Germania shipbuilding yard at Kiel 2,811, the coal mines 7,877, the iron mines, etc., 6,231 persons.

ASBESTOS PRODUCTION.—According to a report made to the Geological Survey by Dr. Joseph Hyde Pratt, the production of asbestos in the United States in 1903 was only 874 short tons, which compares with 1,005 short tons in 1902. Most of the asbestos reported in 1903 came from the mine at Sall mountain in White county, Georgia, but small quantities were mined at Dalton in Berkshire county, Massachusetts, and near New Hartford in Connecticut. Some deposits near Lowell, Vermont, are being explored.

SINKING THROUGH QUICKSAND AT THE SUSQUEHANNA MINE.*

By H. B. STURTEVANT.

At the Susquehanna mine, at Hibbing, Minn., on the Mesabi range, the conditions given were a surface thickness of 138 ft., of which 57 ft. were dry sand, 50 ft. quicksand and 31 ft. hardpan. A small shaft, to be used as permanent drainage and timber shaft, and for the immediate purpose of draining the surrounding ground where the main shaft was to be sunk, was started February 15, 1903. This was calculated for a size of 3 by 10 ft. inside timbers, timber 12 by 12, studdles 3 ft. and hanging bolts 1.5 in. The shaft bearers were 20 to 24 in. diameter and 32 ft. long. At the depth of 45 ft. 6.75-in. wire ropes were used to hang the shaft from the bearers. At the depth of 57 ft. water and quicksand were encountered, and, as there was considerable pull on the ropes, we built two trusses at the collar of the shaft, using the bearers as the lower chord of an ordinary queen-post truss. From 57 ft. the drop shaft method was used. A shaft set was beveled to an edge on the outside of shaft, placed in position and forced down, filling in other sets above it and under the jacks successively, bolting timbers to each other, and hoisting the sands and pumping the water. In this manner we sank 15 ft., but could go no further, and the operation was repeated until a depth of 85 ft. was reached. I speak now of what we did, but the experience was valuable, and we modified the methods later, in sinking the operating shaft, to be mentioned further on.

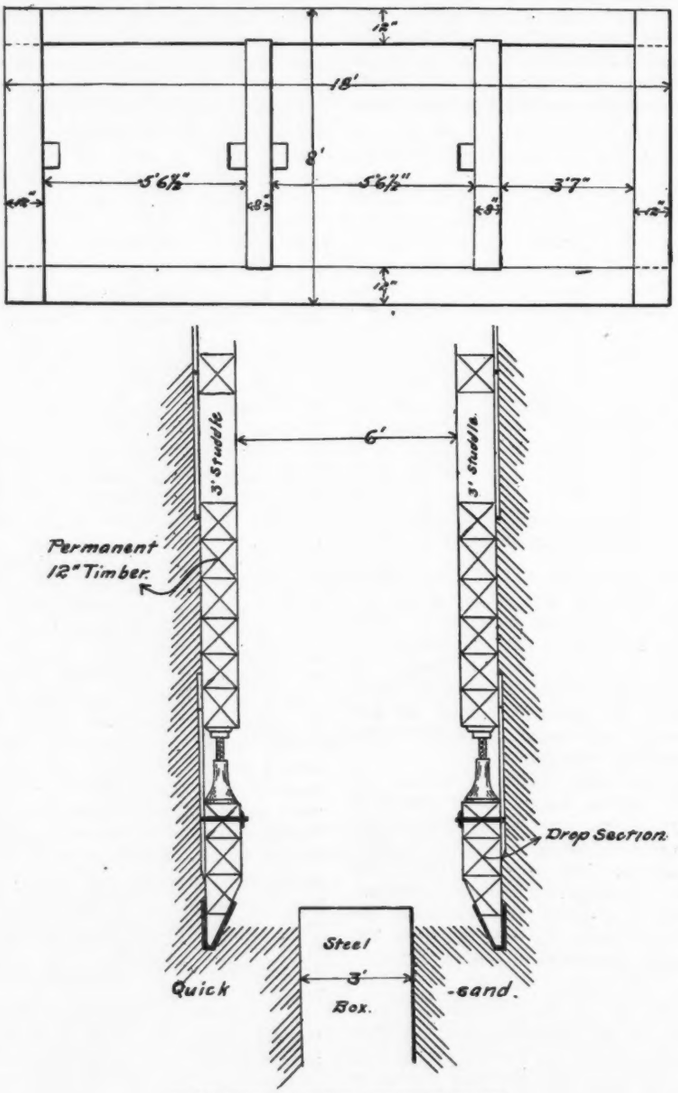
At 85 ft. the pressure of sand being very great and difficulties increasing, we reduced the size to 6 by 8 ft., building up inside the shaft a solid box with bottom edge beveled, but flush on outside, and this solid box was forced down 22 to 107 ft. and imbedded in hardpan. At 85 ft. the timbers were anchored to the collar trussed bearers by four ropes 1.5 in., thus making, all told, 10 wire-rope hangers, besides the usual iron hangers. At 107 ft. the timbers were again anchored by wire ropes. The enormous strain on the shaft timbers, due to quicksand, was manifested by the washers, 8 by 8 in., pulling into the bearers fully 2 in. During the entire process we forced in advance of the timber a sheet-steel box 3 by 5 ft. of 0.5-in plate, put together with angle-irons, and 10 ft. long. This box was forced down in the middle of the shaft; it partially drained the bottom, and served as a sump for the pump suctions.

Progress in quicksand was very slow, and 8 to 10 ft. per month was all we could do, the rate carrying from nothing to 6 in. per day. We found, as others have, that the great danger to success lies in the sand and water bubbling through under the bottom timbers. To prevent this the sand was not removed faster than necessary, and when bubbling was indicated, a plank hewn to edge on end, or a shovel, was used, and water allowed to rise a few feet. Further, during the entire work in quicksand we ran eight-hour shifts, work progressing continuously in order to hold what we had made. To avoid trouble over the idle Sunday, the sand was not removed at bottom, and water was allowed to rise to the pumps. In hardpan below 107 ft. depth the process used was driving lath, removing ground, and placing timbers, bolting them together. Sinking progressed in clay at the rate of 1.5 ft. per day, until the shaft was opened on the ledge of ore at 138 ft. on September 14, or seven months from date of beginning. The drainage increased to 300 gal. per minute on July 1, at 90-ft. depth, and 450 gal. at 138 ft. Duplex sinking pumps were tried, but were unsatisfactory, because of jumping in case of air in the suction, and No. 10 Camerons were substituted. The shaft is only 2 ft. out of plumb; but this does not impair its serviceability for pumping and timber.

In sinking it was found necessary to use great care to maintain the bottom edge of timbers exactly level in quicksand, or the shaft would sink out of plumb. The water would occasionally make cavities, which would fill suddenly, producing a great strain on timbers and hanging ropes, and there would be no way of anticipating this; as the timber was solid there was no way to inspect behind it. Anticipating these troubles, we would, while sinking ram hay behind timber, and the effect was to prevent dirt washing down on the outside of shaft. It is also necessary in sinking in quicksand to hoist no more sand than possible; that is to say, the sand will try to run into the shaft under the timbers, and if removed too fast the sand outside the shaft will become loosened and run, and cause timbers and irons to break, and the whole work may be ruined. On one occasion we noticed unusual bubbling, and we immediately stopped the pumps and allowed the water to rise 15 ft., and then lowered sand from the surface and filled the shaft several feet, in which condition it stood, efforts to resume being without success for six days, when sinking was resumed.

The hoisting shaft was begun July 28, 1903, 40 ft. distant east from the drainage shaft. The size was 6 by 16 ft. inside, with the usual timbering, to the water line. It was found that the drainage shaft pumps had drained the ground at the hoisting shaft to such an extent that a No. 7 Cameron, working slowly, handled the water. The same difficulties were encountered as in the drainage shaft, but in a lesser degree, and we are satisfied that had we not partially drained the ground by the small shaft it would have been impossible to sink the large one, because the troubles are in proportion to the external dimensions.

The method in the quicksand in the hoisting shaft was quite different from that used in the drainage shaft; and particular attention is called to the following details, as we consider the plan a successful one, and so far as we can learn, one which has not before been used. A drop-section of shaft timbers, of full size of shaft, was framed and placed in position. It is 4 ft. in depth, made of 12 by 12-in. timbers, bolted together and braced; the lower two sets



SUSQUEHANNA MINE—SINKING SHAFT.

*Paper read before the Lake Superior Mining Institute, at the Ironwood Meeting, August 17, 1904.

are beveled, flush outside, and a 0.125-in. steel plate shaped to fit the edge, was fastened by spikes, making a shoe or edge 3 in. wide to cut the sand; on the outside of this drop-section was bolted a sheeting plank, with lower edges hewn thin, so as to offer less resistance to sand. The upper ends of the plank extended 3 ft. 6 in. above the timbers, as indicated in sketch, and behind the last permanent shaft timbers. Twenty or thirty jacks, 2.5 by 18 in. were operated between the drop section and the last permanent timbers, the plank sheeting serving to retain the sand. As the jacks forced down the drop-section they were removed temporarily, and timbers placed and bolted to the last permanent timbers; and to bring the permanent timbers close together, pockets were cut out for nuts and washers. In other words, as the jacks forced down the drop-section, the permanent timbers were placed above the jacks, and this process was continued until the iron shoe was imbedded in clay at 107 ft., after which we drove lath and, after removing the ground, put in timbers.

As this was to be the hoisting shaft it was necessary that it be vertical and truly in line, without serious variation. The greatest possible care in the use of jacks was necessary to success in this particular. The greatest variation from vertical is only 6 in. As an additional protection against a crooked shaft, we placed 8 by 8-in. diagonal braces at each end from the collar of the shaft down to depth of 85 ft. The necessity of these braces might be questioned, but our experience in the drainage shaft—where the washing away of sand behind the timbers and the caving caused the entire shaft to surge several inches—prompted us to take no chances. The shaft timbers were hung by wire ropes from the bearers at the collar of shaft; but it was not necessary to truss the bearers as in the case of the drainage shaft.

As an improvement, I might suggest the substitution of steel sheeting for the plank, as less liable to break or get loose; and, further, the steel, being thin, would allow the drop-section to cut the sand easier. We sank the shaft through the quicksand at the rate of 8 ft. 6 in. to 9 ft. 6 in. per month, working continuously, excepting Sundays. On reaching hardpan on January 1, we sank at the rate of about 1.5 ft. per day. As to speed of sinking in quicksand we shall not boast, but we modestly claim success in continual progress, and that we did not lose either shaft; neither did we lose the headway gained, excepting on the occasion mentioned above, and, further, our hoisting shaft has a variation of only 6 in.

In conclusion I will say that for our conditions and with 50 ft. of quicksand I can suggest no improvement over the methods used at our hoisting shaft. However, if the quicksand were 100 ft. deep, the difficulties would increase, and it is probable that the freezing process might be more successful, and more rapid, although the method described could be used. The essential feature of our success was the solid drop-section with steel shoe, and with back lath well secured and extending upwards to span the open space occupied by the jacks.

Fuller's earth resembles ordinary clay in nearly all its characters, but may be distinguished by the fact that it does not become plastic with water, the particles separating and crumbling into mud. The largest deposits of fuller's earth are found in Florida, England and Saxony.

THE GEOLOGY OF SOME LANDS IN THE UPPER PENINSULA OF MICHIGAN.*

By ROBERT S. ROSE.

In this paper Mr. Rose treats especially of certain lands owned by the Michigan Land & Iron Company, which is a large holder in this region. The lands are situated in the Negaunee, Ishpeming, Michigamme, Crystal Falls and Mansfield formations, in all of which producing mines are now open. The paper refers briefly to the geological formation of these districts, and states that, so far as previous exploration was concerned, the ground may be considered virgin territory. The Champion mine, for instance, was due more to persistent exploration than to any peculiar geological conditions, and at any one of half a dozen localities in the hard-ore belt there might be shown up as good a mine as Champion. The work of the United States Geological Survey has been so thorough on the Marquette range that the maps locate roughly all the lands on which the hard-ore formation may be found. Only two mines are working west of Ishpeming —Republic and Champion—and the former owes its existence to peculiar geographical conditions, the other to persistent exploration in a regular formation, no more folded than at many points of the belt. At many prospects small lenses of clean ores have been found, at comparatively shallow depth, but nothing has been done in the way of work to prove their depth and size. As far as present information goes, the limonite ores, in the Michigamme slates, are in a somewhat persistent horizon on a foot of black graphite slates, varying in thickness from 300 to 1,000 ft. This slate, in turn, lies on the Ishpeming formation, characterized by strong magnetic attraction in places and occasional outcrops of magnetic schist. The limonite ores are supposed to lie in folds of the slates. This ore horizon lies in a line of feeble magnetic attraction, which is sometimes totally obscured by the stronger attraction of the Ishpeming formation. Ores occurring in pitching folds will doubtless continue to great depths, and mines abandoned in the early days as exhausted will be liable to show new lenses if properly explored.

In the Humboldt-Champion district there are two lines of magnetic attraction, the northerly one through North Phoenix, Pascoe, Hortense, North Champion and Bessie mines, the southerly through Northhampton, Marine, Phoenix and Gibson mines. All these are small properties and most are now idle. Bessie mine, in section 35-48-29, is working in a deposit of limonite ore that occurs in an eastward pitching fold of the Michigamme slates. The line of magnetic attraction shows that a continuation of this ore body may be expected on the southeast quarter of the section. In the northeast quarter there is a sharp bend in the formation and a most favorable location for exploration is developed. Several other points that, in Mr. Rose's opinion, should be explored were referred to.

Considering the Michigamme district, a limonite formation, no especial geological feature was to be noted, excepting a continuous diorite ridge that runs north of and parallel to the iron formation. These sections, 21, 23, 25, 27, 29, 31, 33 and 35, T 48 R 30, are all underlain by the Ishpeming and Negaunee formations, and ore may be expected on any of them. Section 7 is the extreme western end of the lower Marquette rocks, as far as they have been traced by any of the geological surveys, but the iron formation probably extends in a west-northwest direction across the north part of 48-32, southwest part of 49-32 and south part of 49-33, etc. In 48-31, sections 25 to 35 show outcrops of the mica slates and schists of the upper Michigamme, and while very little prospecting has been done on any of them, there is a good chance for ore. The north soft ore formation is well defined west of Michigamme and has been opened at various points, notably at Beaufort and Ohio, now working, at Imperial, Webster and Titan. The large area of Michigamme slates compressed into many folds south of Lake Michigamme, makes many favorable places for exploration.

In L'Anse district, the only mine worked is the old Taylor, which shipped about 30,000 tons of non-bessemer ore that ran from 55 to 60 per cent iron. A complete analysis of samples recently taken is as follows: Iron 58.90, phosphorus 0.219, silica 6.42, manganese 0.67, lime 0.321, magnesia 0.306, alumina 0.83. The ore body was from 35 to 40 ft. wide, and the deepest shaft was only 150 ft. The ore is a mixture of a soft red and blue hematite and limonite. The formation is similar to that of the eastern mines of the black slates, but on account of the frequent occurrences of bunches of soft red hematite it seems to be the connecting link between the Marquette and Crystal Falls ranges in the upper Huronian slates. Section 9-49-33 is almost entirely underlain by the iron formation, and indications are for at least three parallel folds running completely across the section; in any one, or all, of these folds there may be merchantable bodies of ore. The mixed ore, as shown by pits, is about 200 ft. wide, and if the fold is a deep one large ore bodies are almost sure to exist. In the half of section 7 good fleat is found and the magnetic attraction is excellent, the same may be said of sections 3, 5, 17 and 19. Considerable exploration is now under way in L'Anse district near the old Taylor.

In Republic district considerable exploration has been done by drills and otherwise. Mr. Rose questions the accuracy of the results of the drill exploration by the Algoma Commercial Company, that at the depth of 2,475 ft. seemed to cut the bottom of the formation and was in the underlying diorite. He thinks that this hole, which was not tested for verticality, may have been deflected, as were all of the Channing holes, put down in the same region ten years before. If this Clergue hole was not vertical, there is chance of finding ore in this fold. The Algoma Company also did some sinking, but stopped work when a few feet from ore, according to Mr. Rose. The formation has been located in 29-46-30, the magnetic line in the north part of 45-30. In many sections of this formation the magnetic lines are marked and in some there are old mines and newer prospects. For a good part of the district very little is known as to the geology. By piecing together magnetic observations of several observers a new oval has been made out, that embraces the northwest part of 46-31, the southeast part of 47-32, the southwest corner of 47-31, and the northeast part of 46-32. The interior of this oval is high, with no outcrops, and it is impossible to tell without exploration whether the central core is granite or greenstone, but this magnetic line doubtless represents the hard ore formation.

Lands in the Crystal Falls district are near Dunn mine, where the iron ore formation has

*Abstract of paper read before the Lake Superior Mining Institute at the Ironwood meeting, August, 1904.

been proved up by numerous pits, but no deep work has been done. These lands have a chance of carrying the Mansfield bessemer formation, and the line of contact between the Hemlock diorite and the Randville dolomite has been accurately laid down. Certain explorations show that the greenstone forms the hanging wall of a jasper-chert iron formation that has for a foot the Randville dolomite, and this must be the Mansfield formation, which is very soft, and therefore rarely outcrops.

The ores of Amasa are soft red and brown non-bessemer hematites. The formation is chert and jasper below a hanging of black, pyritiferous slate with a foot of sometimes magnetic black slate grading down to the Hemlock greenstone. The formation is magnetic, and has been located where quite heavily covered by drift by the United States Survey, by means of dial and dip compass. Several lands are recommended for exploration in this district by Mr. Rose.

The chief value of this paper, so far as any but the intending explorer is concerned, is in the light it throws upon the statement so often made that, in these older regions, especially on the Marquette range, there is no more room for the discovery of ore, as exploration has been thorough and complete. If the older regions of the Lake district possess so many localities where exploration can be conducted with a fair chance of reward, as Mr. Rose believes and seems to demonstrate in his paper, there is abundant ground for the hope that for many years this region will be the scene of persistent exploration and of the discovery of many mines throughout a wide range. As the consumption of ore increases and the limits of merchantable ores set by furnace-men lowers, it will widen the demand for new mines and will permit the exploration of many of these fields where there is now only the hope of reward, and where the ores to be found are probably limonites and lean hematites.

According to the Royal Mint, the coin in use in Great Britain—including that in bank reserves, as well as that in circulation—is £124,000,000, or $620,000,000; of which £100,000,000 is gold and £24,000,000 silver. *L'Economiste Francais* estimates the total stock of coin in France at 7,000,000,000 fr., or $1,400,000,000. In France a much higher proportion of silver is in use than in Great Britain.

PHOSPHATE ROCK PRODUCTION.—The production of phosphate rock in the United States is given by Mr. E. O. Hovey in a report to the Geological Survey at 1,581,576 long tons. Of this quantity Florida contributed 860,336 tons; South Carolina, 258,540 tons; Tennessee, 460,530 tons; Arkansas, 2,125 tons, and North Carolina, 45 tons. Florida showed a decrease in hard rock phosphates, but a large increase in pebble. The greatest gain last year was in the Tennessee district.

AMMONIUM SULPHATE IN GREAT BRITAIN.—The official blue-book issued by the Chief Inspector of Alkali Works in Great Britain states that the production of ammonium sulphate in 1903 was 233,664 long tons, as compared with 229,316 tons in 1902 and 217,213 tons in 1901. Of the output last year, 149,489 tons were recovered by gas works, 19,119 by iron works, 37,353 tons by distillation of shale, 17,438 tons by coke ovens, and 10,265 tons by carbonizing and producer-gas works.

AN INTERESTING OCCURRENCE OF PLATINUM.*

By L. HUNDESHAGEN.

When visiting western Sumatra in 1901 my attention was directed to the unusual conditions surrounding the occurrence of a deposit of wollastonite and grossularite, and the opportunity arising, a further study of the ground was made last year. The deposit is situated near the highroad at the Singenggoe river, west of the village Moeara Sipongi, and about 35 miles from the sea-coast. It contains gold, with small quantities of platinum, and in former times was mined by the Malays.

Ancient schists are found 30 miles southwest of the deposit. They are older than the granites that occur in many parts of the district at the same or higher levels. To the north the ore-body is cut off by a dike of hornblende rock, which contains no garnet and shows no transition into the deposit. On the west the deposit is covered by a cap of blackish augite-diorite, under which a little granite outcrops, while almost the whole area is covered by the ejecta of an enormous extinct volcano, the crater of which lies 19 km. due south. Far to the north primitive and Cambrian schists are met with, as well as remnants of the Carboniferous limestone series.

Upon a consideration of the facts outlined, I am of the opinion that the present ore deposit was originally a layer or lens of limestone embedded in the schists, which has been altered by the granite apophyses into garnet and wollastonite, and simultaneously or subsequently mineralized by hot solutions carrying copper, gold, platinum, etc. The almost horizontal zone of contact between the granodiorites and limestones has been fairly well disclosed by ancient and recent workings. All the characteristics of an intense, though local, metamorphism are noticeable at the base of both the Carboniferous limestone and the clay slates.

The ore that carries platinum is composed of the following minerals: Wollastonite, 85 to 88 per cent; grossularite, 12 to 14 per cent; bornite, traces to 5 per cent; magnetite, pyrite, manganese and calcite, traces. Arsenic being absent, there is no ground for believing that sperrylite is present.

An analysis of the wollastonite showed it to be a nearly pure silicate of lime, with only a trace of magnesia and less than 1 per cent of iron, alumina and manganese. The absence of magnesia in a platinum ore is rather striking, the more so as serpentine rocks occur in the vicinity of the primitive schists and because a white magnesite rock is met with only a few hundred meters from the wollastonite.

It is furthermore remarkable that a sample of slightly decomposed wollastonite, with no copper, proved to be richest in platinum, as shown by a specimen that assayed 6 grams platinum, 4 grams gold and 2 grams silver per metric ton. Selected samples of ore containing 2 to 10 per cent of bornite and malachite, on the other hand, showed only traces of platinum with from .15 to 2,300 grams gold and 15 to 560 grams silver per ton. Auriferous garnet, poor in wollastonite, appears also to contain no platinum.

In thin sections, no platinum could be detected under the microscope; nor could any be seen when finely powdered ore was concentrated in a batea. The concentrated river sand, 15 to 25 m. from the outcrop, shows small particles of gold and rounded grains of platinum varying from 0.1 to 0.3 mm. in size.

Platinum is associated with diamond placers in western and southwestern Borneo, but it occurs in thin scales, varying from 0.1 to 1.0 mm. in size. Besides the usual metals, the scales contain copper in amounts varying from 3.8 to 4.5 per cent, evidently as an alloy, since the copper cannot be extracted by strong nitric acid.

Although peridotites abound in Borneo no platinum could be found in their close vicinity. The diluvial platiniferous gravels occur at a distance of from 10 to 30 km. from the deposit described. The facts point to the conclusion that the occurrence of platinum in the Indian archipelago is unusual, and that the metal is not derived from serpentines.

*Abstract of a paper read before the Institution of Mining and Metallurgy, London, July 21, 1904.

LIMESTONE SCREENINGS FOR USE IN CONCRETE.

The advisability of using stone-crusher dust as a substitute for sand in the aggregate for concrete is at present the subject of considerable discussion among constructing engineers. It is of considerable interest to mining and metallurgical engineers both with regard to structural work and the possible sale of mill tailings in favorable localities.

G. J. Griesenauer has just stated (*Engineering News*, July 28, 1904) that tests in the laboratory of the Chicago, Milwaukee & St. Paul railway have shown that limestone screenings are far superior to sand as a concrete aggregate. Screenings that will at least all pass a 4-mesh sieve but not finer than an 8-mesh are the most valuable. A finer mesh than eight tends to give a product containing an excess of impalpable stone dust, especially if a soft limestone be employed, while a coarser mesh than four gives a product of which the handling is likely to separate the coarse and fine particles to some extent.

Crusher-run limestone would be better than screened crushed limestone if it were practicable to avoid a separation of the coarse and fines, but this being impossible the product is not uniform and therefore is likely to produce a non-homogeneous concrete. Consequently it is preferable to screen the crushed stone and keep the coarse and screenings separate, mixing them in the proper proportions when required.

The quality of the limestone affects the value of the screenings, very soft stone being naturally inferior to the harder kinds. A very soft limestone should not be reduced to as fine screenings as a harder stone. There is nothing to indicate that limestone screenings may weaken after a certain age any more than sand, the particles in each case being enclosed in cement whose tendency is to increase in strength with time.

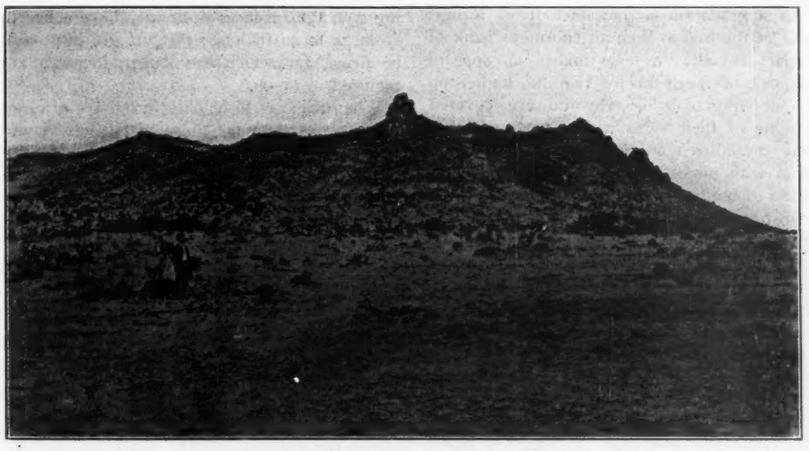
The report of the Royal Mint shows that in 88 years—1816 to 1903, inclusive—the British gold coins turned out amounted, in round figures, to £582,000,000, of which £366,000,000 were coined in England, and £216,000,000 in Australia. This includes £69,000,000 old coins re-minted, so that coins to the value of £513,000,000 were made from new gold and foreign coin. Only about one-fifth of this amount —or £100,000,000—is believed to be now in the United Kingdom, in use. Export, use in the arts, private hoarding, actual loss and destruction account for the other four-fifths.

SOME NOTES ON THE CERRO MERCADO.*

BY OLIVER CUMMINGS FARRINGTON.

The Cerro Mercado, or Iron Mountain, is a hill largely made up of solid iron ore. It is situated three-quarters of mile northeast of the City of Durango. In form it is elongated, with a roughly triangular outline, the base of the triangle lying towards the west. Its general trend is nearly east and west, or more exactly, as given by Witherbee, N. 83° E. The hill rises abruptly above the alluvial plain, upon which the City of Durango is situated, to an average height of about 300 ft., with single peaks 50 to 100 ft. higher. The length of the hill is about one and one-third miles, and its average width about one-third of a mile. At about the middle of its extent in an east and west direction, an inset of eruptive rock cuts it practically in two, although the iron ore may be in contact below.

The black color of the iron oxide, of which the hill is composed, is in striking contrast to the yellow and green of the surrounding plain. The hill is almost bare of vegetation, except for straggling cacti, and its outline is bold and rugged. Steep cliffs 10 to 20 ft. high, and even higher, are not infrequent, and in



CERRO MERCADO, FROM THE PLAIN

places exhibit a distinct columnar structure like that of basalt. Such cliffs are composed wholly of ore. They bear no vegetation. From these projecting masses of iron ore, talus slopes lead, as a rule, down to the level of the plain. These slopes are generally rather steep. The talus consists largely of fragments of the ore intermingled with soil and fragments of other rocks. Among the ore fragments occur some described by Witherbee as being rounded and nodular, and imbedded in stiff, clayey matrix. Such have probably been water worn. In a later article this author states that the nodular ore extends to the east for over a mile, and to the south it was found 3.5 miles distant at a depth of 60 ft. when digging for water. At this point it was embedded in a gravelly clay. There can be little doubt that these fragments have been distributed by the same fluviatile agencies which deposited the gravel.

It seems evident, from many considerations, that on the whole the ore of the Cerro Mercado may be regarded as chiefly hematite, although in many cases, doubtless, a mechanical mixture of magnetite occurs.

This hematite varies considerably in physical characters, being now hard and now soft, now black and now red, now specular and now earthy. Of these varieties, the hard, solid, black ore is the most abundant and forms the chief mass of the mountain. It is this which forms the prominent cliffs and columns and projecting spurs. It is essentially solid and continuous, although narrow open spaces frequently penetrate it, usually lined with octahedral crystals of martite. The hardness and toughness of this ore are such as to make the task of mining and crushing it a difficult one. It is very severe, Witherbee states, on the hard parts of crushers, and will cut into the face of the hardest steel hammers. In fact, this toughness has been a serious obstacle hitherto to the use of the ore, and has resulted in the utilization chiefly, up to the present time, of the soft red variety found at the base of the mountain.

The amount of ore in sight above the level of the plain is stated by Witherbee to be at a conservative estimate 360,000,000 tons. Explorations which have been made in depth have found no limit in this direction.

The hill has long been celebrated, its existence having first been reported in 1552 A. D. In that year a Spanish captain, Gines Vasquez del Mercado by name, having set out from Guadalajara to search for mines of gold and silver, was led to the hill by reports of its being a mountain of gold. On finding it iron instead, the name of Mercado was applied to it somewhat derisively by his soldiers.

In later years a report seems to have been quite widely circulated that the mass was a huge meteorite, and it is not uncommon to hear this stated at the present day. Weidner states that Humboldt thought it was a meteorite, but, as Burkart shows, Humboldt does not say this. Humboldt says of the Cerro del Mercado simply that it "contains an enormous mass of brown magnetite or micaceous iron," although he seems not to have visited it. In another place he refers to a meteorite found in the outskirts of Durango, which Weidner confuses with the Cerro Mercado. More general and persistent than the belief in the meteoric character of the hill seems to have been one that it would prove rich in gold or silver, and many pits have been dug and many attempts made at various times to extract these metals from the mountain. Birkinbine mentions one shaft 70 ft. deep made through solid ore on the north side of the mountain, with drifts extending from its bottom, which was probably sunk with the hope of finding precious metals. In the iron ore of the Murca ranch, a deposit of similar origin to the Cerro Mercado and connected with it, Witherbee reports that as much as 9 oz. of silver and 0.5 oz. of gold have been found.

The first serious attempts to use the deposit

CERRO MERCADO—WESTERN END.

as a source of iron seems to have been made in 1828, when an English company, under patronage of the Governor of Durango, established some works on the bank of the Rio Tunal, 5 miles south of Durango, on a site known as Piedras Azules. Motive power was secured by a dam across the river, and a blast furnace was erected. First attempts to obtain iron from the ore were, however, unsatisfactory, and the project was soon abandoned. In 1834 a new company took the matter up, and by constructing a blast furnace of different type, succeeded in obtaining a product of 5,000 to 8,000 lb. of iron a week. With some intermissions a small output of iron from these works has been maintained ever since. About 1882 a larger plant was erected close to the western end of the mountain. Successful operations were not conducted here until 1888, and

BLAST FURNACES AT CERRO MERCADO.

only within the last five years has a steady production been maintained. The fuel used is charcoal, or charcoal and coke, the charcoal being made largely from the mesquite. For flux, limestone, obtained about 25 miles distant on the line of the Mexican International railroad is used. The iron produced is said to have exceptionally good chilling qualities and to be very strong.

Beside the use of the ore as a source of

*Extract from 'Observations on the Geology and Geography of Western Mexico.' Field Columbian Museum, Chicago, 1904.

iron, it has been found valuable as a flux for the smelting of lead, and is employed extensively for this purpose in various smelters in Mexico. Such a use of the ore began with the advent of the railroad to Durango in 1893, and since that time more than 400,000 tons have been so employed.

The age of the rocks to which the series of the Cerro Mercado belongs has been stated by Ordoñez to be late Tertiary, and this opinion is generally concurred in, since there is no doubt that the main elevation of the Mexican Cordilleras took place in Eocene time, and that the eruption of the rhyolites about Durango was subsequent to this.

Being formed, therefore, in so late a period in geological history, the Cerro Mercado is unique as compared with other extensive iron deposits, such as those of Sweden and the Lake Superior region in North America. These, as is well known, are considered pre-Cambrian in age. De Launay has called attention to the latter fact, as indicating that these deposits owe their origin to conditions prevailing in the earlier stages of the earth's history, when the crust was relatively thin. He concludes that the processes of their formation must have been deep-seated in character, because the products have been brought to light only after long ages of erosion. If the Cerro Mercado, however, owes its origin to similar processes, it is evident that they are capable of operating in the later periods of the earth's history as well as the earlier.

The association at the Cerro Mercado of a large amount of iron oxide with relatively acid rocks is another unusual feature, since for the most part other iron deposits of probable igneous origin, such as those of the Urals and of Sweden, have basic rocks in association. The most important exception to this rule seems to be the deposit of Kirunavara, Sweden, in connection with which De Launay notes acid porphyries (quartz keratophyres), as occurring in considerable quantity.

The question of the origin of the Cerro Mercado is not one which has been heretofore extensively discussed. Weidner considered it to represent the product of a volcanic eruption, while Burkart regarded it as intrusive. Weidner's view of the volcanic origin was based chiefly on the tuffs found in the vicinity and the absence of evidences of contact metamorphism. Chrustschoff considered the process eruptive and that the stratigraphy showed that the iron oxide at two points broke through the porphyry and spread out over the latter. On account of certain peculiarities in the appearance of some of the ore lumps, however, he was of the opinion that the outpoured mass was, at the time of its eruption, in a "hot-fluid, watery" condition. Ordoñez believed that the iron oxide was of a later origin than the surrounding rocks and filled a fissure formed in them. The supposed steps of the process are not indicated, however, in any further detail by this author. With the exception of Ordoñez it will be seen that the general trend of opinion has been in favor of an eruptive origin for the mass. Among earlier writers, however, the possibilities of sedimentary origin of iron deposits were less generally accepted than now.

In favor of an igneous origin for the iron oxide of the Cerro Mercado, the wholly igneous character of the accompanying rocks, the integrity, continuity, and extent of the iron oxide, and its unstratified, columnar structure, are the factors which in the view of the present writer weigh most strongly.

If it be of igneous origin, it is quite difficult to conceive of the steps of the process by which it was formed. It seems necessary to suppose that either, on the one hand, it welled up from below and filled a fissure, or that, on the other hand, a separation took place into an acidic and basic portion while the magma was still in a fused condition. If the former action took place one would expect to find evidences of contact metamorphism such as have not yet been observed. The latter supposition seems equally untenable, however, owing to the difficulty of conceiving of the separation of a magma into proportions so acidic on the one hand and so basic on the other. That masses of magnetite of considerable bulk may be of eruptive origin seems to be generally conceded, several occurrences being usually so explained. In most of these cases, however, the accompanying rocks are basic in character, so that it is not difficult to conceive of the separation of iron from such a magma. As already noted, the rocks accompanying the iron oxide at the Cerro Mercado are acidic in character.

At many points on the mountain the line of demarkation between eruptive rock and iron oxide is sharp and distinct, while at other points a gradation is traceable. Thus Rangel says, "at the base is seen an enormous bank of compact rhyolite; a little higher up appears a deposit of fragments of rhyolite, higher up yet the fragments of rhyolite are covered on some of their sides with ferruginous material crystallized in small octahedrons and mixed with pieces of the mineral. The proportion of mineral increases as the height until it constitutes exclusively the material."

Witherbee also describes "large lumps of what appears to be solid iron ore, which, upon breaking, prove to be only pieces of *cantera* covered with a superficial coating of iron oxide, often highly crystalline, and only from 0.25 to 0.5 in. thick, as though the rock had been immersed in molten iron oxide." Moreover, the studies made by various geologists show a change in the substance of the rock itself in approaching the mountain. It becomes more basic, though not highly so, and shows a gradual increase in content of iron. Do such phenomena as these represent primary or secondary changes? If primary, is the iron oxide younger than the undoubted eruptives? If so, has it flowed over them, or has the separation been of a magmatic nature? If secondary, can the phenomena be referred to the action of infiltrating waters? Such are some of the questions regarding the origin of the mass of iron oxide which remain yet to be answered. Metasomatic processes, to which, for several reasons, the origin of the iron might be ascribed, should, it would seem, more extensively impregnate the adjoining rocks than has been the case.

Again the derivation can hardly be ascribed to ferrous silicates of the adjoining rocks as in the case of the Lake Superior ores, since such silicates seem to be practically lacking in the associated rocks here. On the whole, therefore, the relation, either in time or manner of origin, between the associated eruptive rock and the iron oxide, and the origin of the iron oxide itself, seem as yet difficult to determine.

Gypsum contains 20.9 per cent water, while plaster of paris contains 7 per cent. In calcining gypsum care has to be exercised against overheating, for if the water is entirely driven off the calcined material loses its hardening properties when mixed with water.

CHLORIDIZING ROASTING OF SILVER ORES IN MEXICO.

By Ernest Stein.

The furnaces usually employed in Mexico for the roasting of silver ores are the hand-stirred reverberatory and the revolving White and Howell furnaces. In the present article I shall limit myself to a description of the working of the reverberatory furnaces.

The reverberatory furnaces are made in different sizes, the hearth having a width of 6 to 10 ft. and a length of 14 to 40 ft., divided into from 2 to 6 compartments. The various devices of this kind in use are described in the following pages.

At the Barradon mill, in Guanacevi, the first furnace used had a hearth 10 by 40 ft.; but to increase the capacity it was cut in two, converting it into a double furnace with two hearths about 16 ft. long. It was found that the ore could be roasted to as high a percentage in the re-modelled furnace as before; later another furnace was built having hearths 7 ft. wide by 14 ft. long.

Experience in the operation of these furnaces shows that dry crushed ore may be chloridized as well in a furnace 14 ft. long as in one of the larger size. In mills crushing wet, the furnaces ordinarily have a hearth from 24 to 40 ft. long; the wet ore must also be dried, for which the longer furnaces are required.

When the ores to be chloridized are of clean silicious character, as those of Guanacevi and Guazaparez, there is absolutely no necessity of using the longer furnaces; the action of the second and third hearths is not roasting but merely heating; the only benefit derived is the preliminary heating of the charge, which may be accomplished as well by feeding the raw ore into the second hearth, thereby reducing the labor as well as extra expense incurred in building the furnaces with the additional hearths, or greater length.

Successful roasting in the hand-stirred reverberatory depends largely on the skill of the men and the proper manipulation of the ore on the roasting hearth. To chloridize effectively the ore must be handled on the first roasting hearth, so as to expose all of it to the strong heat near the bridge-wall. Merely scattering the ore over the hearth results in chloridizing one portion to a high percentage, while that at the back is not subjected to sufficient heat to be chloridized properly, so that unless the cooler portion of the charge be brought forward a poor roast will result. In transferring the cooler portion to the front and the chloridized ore to the back, care must be taken not to mix them. The percentage of silver volatilized varies between 4 and 15 per cent. With proper attention the losses of silver may be kept low, while with unskilled or careless workmen the loss is usually high, depending somewhat on the character of the ore as well as the percentage of sulphur, which it contains.

In roasting ore which is to be treated by pan amalgamation, more salt is usually required than if lixiviation is to be the process. Sufficient salt must be added to chloridize the ore to as high a percentage as possible, since the percentage of silver recovered by pan amalgamation usually does not exceed the percentage of silver actually chloridized and present as silver chloride at the time of charging the ore into the pans. If an excessive quantity of salt is used, the tendency will be to increase the percentage of chloridized silver in the roast, but at the same time the

quantity of silver actually recovered is often found to be less than when a smaller quantity of salt is used. Chloridized ore containing large amounts of free salt when exposed to high temperatures is subjected to excessive loss of silver by volatilization. By increasing the percentage of salt and using a lower temperature, however, the ore may be roasted in less time, although this fact is not fully appreciated. In general practice the capacity of roasters remains the same whether 3 or 8 per cent of salt added.

The actual quantity of salt which gives the best results in the mill must be determined in each case. At times it may be more profitable to roast with 4 per cent salt and chloridize 82 per cent of silver than to roast with 6 to 8 per cent salt, although the amount of silver chloridized may be increased to 85 or even 87 per cent.

Another matter of importance is the handling of the ore after it leaves the furnaces. Nearly all of the mills built in recent years are provided with ore-pits of sufficient size to allow the roasted ore to remain in them from 12 to 24 hours. The advantages of the ore-pits are that they increase the percentage of silver chloridized, add to the capacity of the furnaces and at the same time reduce the loss of silver by volatilization. Ore, when discharged into the pits, may be roasted to a lower percentage than is possible when it goes onto a cooling floor. I have noticed at various times that when the roasting was being done by inexperienced men, the ore discharged from the furnace showed an average of from 65 to 75 per cent of chloridized silver, while the same ore after passing the hot ore-pits would be found to contain from 80 to 87 per cent of chloridized silver.

The ore treated by roasting and milling is usually the dry silver or silver-gold ores containing from 20 to 100 oz. silver per ton, at times even more, and from 0.02 to 0.20 oz. gold per ton. Base ore, or that containing much gold, is treated at times, but if the bullion becomes too base or too much of the gold is lost, the ore is either sold to smelters or roughly concentrated. The concentrates can be sold to smelters to better advantage than if treated by straight roasting and milling; the tailings resulting from the concentration are then roasted and treated as usual. Ores containing much gold are not well adapted for lixiviation, as the extraction of gold obtained with a dilute solution of hyposulphite usually does not exceed from 40 to 60 per cent. By employing more concentrated solutions a higher percentage may be recovered, but this is done usually at a loss, as the extra cost for chemicals and the extra expenses for refining or marketing the base precipitate exceed the value of the additional gold recovered.

The manner of handling the ore in reverberatory furnaces varies little at the different mills in Mexico. The following description is based upon the practice at the Guazaparez mill. The reverberatories are placed in pairs, back to back. Each furnace has a roasting hearth 9 ft. wide by 27 ft. long divided into three compartments, each 9 ft. square, and provided with a door through which the charges are handled. Over the last hearth a hopper is placed. The hoppers are charged by means of cars running on a track over the top of the roasters.

The salt is stored in a bin which is filled about once a month. When received at the mill the salt is quite coarse and requires to be crushed. It is fed into a revolving dryer, then through rolls and screens, and the fine salt conveyed to the bin. A large box holding about one ton of salt is placed on the charging floor of the roasters and is filled every few days as required. The salt for each charge is measured in a box, which when full contains 48 lb.; this represents what is commonly known as the 4 per cent charge, the usual quantity of ore taken for each charge being 1,200 lb.

The capacity of each furnace roasting 1,200 lb. charges is about 9.6 tons per day. A roast requires about two hours. The consumption of wood is 0.11 cords for each charge, or from 0.2 to 0.25 cords per ton of ore roasted. For each furnace two men are required, a fireman working at the first hearth and an assistant. The assistant feeds the furnace and transfers the charges, while the fireman receives the charge on the first hearth, chloridizes the ore and hauls the roasted product from the furnace. The fireman receives from $1.50 to $1.75 per shift of 12 hours, and the assistant from $1.25 to $1.50. In addition, a general foreman is required to superintend the work, also one laborer for handling the wood. The foreman receives from $2 to $3 per shift of 12 hours, and the laborer $1. With four of the six roasters in operation turning out about 39 tons of ore per day the expense for labor is approximately $0.85 per ton.

From 6 to 7 cords of wood are used in roasting the 29 tons of ore. With wood at $5 per cord, the costs amounts from $0.77 to $0.90 per ton of ore. Salt costs $60 per ton, and using 4 per cent in the charge the expense comes to $2.40 per ton of ore. Thus the total cost for labor, fuel and salt is $4.08 per ton of ore roasted.

The manipulation of the furnace is carried out as follows: After removing a charge of roasted ore, the door is closed and the assistant transfers the ore from the second to the first hearth. This operation requires about 20 minutes. The fireman now takes charge of the first hearth, while the assistant transfers the ore from the third to the second hearth and allows a fresh charge to fall from the hopper onto the last hearth.

The fireman distributes the ore over the hearth, stirring it with a horseshoe rake. Rabbling continues for about 35 minutes. At the end of this time the foreman removes a sample from the hottest part, or near the bridgewall, for examination. If the sample appears to have been roasted enough the ore is transferred to the cooler portion of the furnace, its place being filled from the back. The transfer requires about 10 minutes, and the charge is stirred for another 10 minutes, which is usually sufficient to thoroughly chloridize the cooler ore; the latter is then sampled and if properly roasted the fireman is instructed to pile the charge. The ore near the bridgewall is moved first, piling it over the discharge hole. After taking a sample from the pile, the slide over the discharge hole is removed, and the ore allowed to fall into the pits, a long-handled hoe being now used to remove the portion not passing readily through the discharge hole. The cover over the discharge hole is now replaced, the door of the first hearth is closed, and the assistant brings forward the next charge to be handled in the same manner.

Working in this way a charge is chloridized in about one and a half hours. The ore remains in the pits from 10 to 14 hours, and is removed twice a day. It is aimed to chloridize in the furnace from 75 to 80 per cent of the silver.

The way in which the furnaces are fired has a great deal to do with the success of the operation. To obtain a good roast, and at the same time avoid excessive loss in silver, the fuel must be added in small portions at regular intervals. Unless the men are trained to fire evenly some of the ore will be exposed to excessive heat, thus increasing the losses of silver by volatilization and also increasing the consumption of fuel. Before the addition of fuel the fire should be allowed to burn low, but never so low that flaming ceases.

Silver ore should never be roasted dead. The roasted ore at time of discharge must still contain some sulphur, which may be identified by the bluish color of the roast. Unless free sulphur is present the results are apt to be a low percentage of chloridized silver, as also excessive loss of silver by volatilization; its absence indicates that the temperature has been carried too high. Ore properly chloridized usually has a color varying from dark red to dark coffee brown, the shade depending to some extent upon the percentage of sulphur in the raw ore, and upon the heat to which the ore has been exposed. But any ore that is black as it comes from the furnace bears evidence of having been exposed to excessive heat.

Oxidized iron or manganese ores containing 1 per cent sulphur, or even less, may acquire a dark gray or even black color after roasting, so as to differ little from the color of the ore in its raw state. Ore failing to show a good color may be considered to contain an insufficient percentage of sulphur to chloridize properly.

To check the work done in the furnaces closely, the ore is sampled before and after roasting. Ordinarily the ore roasted by each man is sampled and assayed separately, but as 16 charges are chloridized in each roaster and four roasters are in continuous operation, the number of samples for each day is 64, and it is out of the question to assay each sample separately. The work may be closely checked without assaying each sample, as I have found at the Guazaparez mill, where the following method has been adopted: For keeping track of the samples two boxes are supplied for each furnace. These boxes are made of light sheet iron 16 in. long, 8 in. wide and from 2 to 4 in. deep. They are divided by partitions into eight compartments corresponding to the number of charges roasted by each furnace during a shift; the boxes are numbered by punching holes in the left-hand corner, No. 1 being used for receiving the samples of ore from No. 1 furnace, etc. From each of the samples thus taken a small cupful of ore is removed to give a final sample representing the eight different charges. This aggregate sample is thoroughly mixed, screened through a 20-mesh sieve so as to remove particles of brick and other foreign matter, cut down to the desired size, and is then ready for assay. In this manner the number of samples actually assayed is reduced to two for each furnace, one of which represents the ore roasted during the day shift, and the other that roasted by the night shift. This will be found to give a close check on the work done by the furnaces.

Oolite is a limestone composed of small spherules cemented into a more or less compact mass. The spherules are composed of concentric layers of lime carbonate, deposited from solution around some nucleus such as a particle of sand or a calcareous fragment. When the spherules are as large as peas or larger the rock is called pisolite.

DUST CHAMBER DESIGN.

By Max J. Welch.

Only a few years ago smelting companies began to recognize the advantage of large chambers for collecting flue-dust and condensing fumes. The object is threefold: First, profit; second, to prevent law suits with surrounding agricultural interests; third, cleanliness about the plant. It is my object at present to discuss the materials used in construction and general types of cross section.

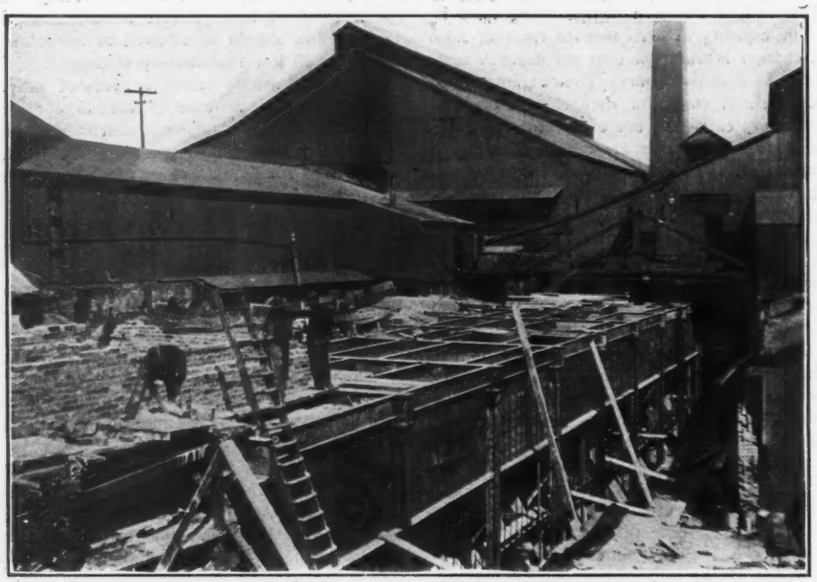


FIG. 1.

Most of the old types of chambers are built after one general pattern, namely, brick or stone side-walls and arch roof, with iron buckstays and tie rods. The above type is now nearly out of use, because it is short-lived, expensive and dangerous to repair, while the steel and masonry are not used to good advantage in strength of cross-section.

With the introduction of concrete and expanded metal, began a new era of dust chamber construction. It was found that a skeleton of steel with cement plaster is very strong, light and cheap. The first flue of the type shown in Fig. 3 was built after the design of E. H. Messiter, at the Arkansas Valley smelter in Colorado. This flue was in commission several years, conveying sulphurous gases from the reverberatory roaster plant. The same company decided, in 1900, to enlarge and entirely rebuild its dust chamber system and three types of cross-section were adopted to meet the various conditions. All three types were of cement and steel construction.

The first type, shown in Fig. 1, is placed directly behind the blast furnaces. The cross section is 273 sq. ft area, being designed for a 10-furnace lead smelter. The back part is formed upon the slope of the hillside and paved with 2.5 in. of brick. The front part is of ribbed cast iron plates. Ninety per cent of the flue-dust is collected in this chamber and is removed, through sliding doors, into tram cars. There is a little knack in designing a door to retain flue-dust. It is simply to make the bottom sill of the door frame horizontal for a space of about 1 in. outside of the door slide.

The front part of the chamber, Fig. 1, is of expanded metal and cement. The top is of 20-in. I-beams, spanning a distance of 24 ft. with 15-in. cross-beams and 3 in. of concrete floor resting upon the bottom flanges of the beams. This heavy construction forms the foundation for the charging floor, bins, scales, etc.

While dwelling upon this type of construction I wish to mention a most important point, that of the proper factor of safety. Flue-dust, collected near the blast furnace, weighs from 80 to 100 lb. per cubic foot, and the steel supports should be designed for 16,000 lb. extreme fiber stress, when the chamber is three-quarters full of dust. If the dust is allowed to accumulate beyond this point, the steel, being well designed, should not be overstrained. Discussions as to strains in bins have been aired by the engineering profession, but the present question is "Where is a dust chamber a bin?" Experience shows that bin construction should be adopted behind, or in close proximity to the blast furnaces.

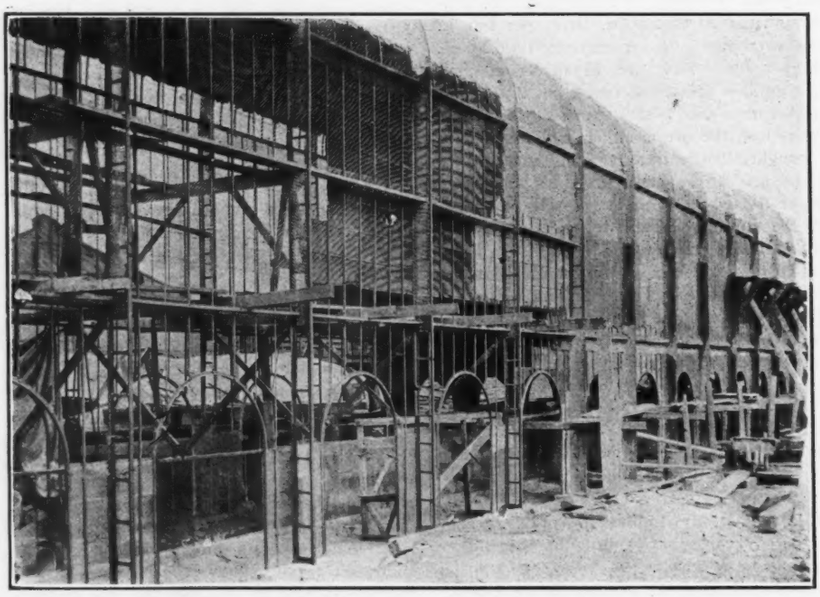


FIG. 2.

Fig. 2 shows the second type of hopper-bottom flue adopted. It is of very light construction, of 274 sq. ft. area in the clear. The beginning of this flue being 473 ft. from the blast furnaces, removes all possibility of any material floor-load, as the dust is light in weight and does not collect in large quantities. The hopper-bottom floor is formed of 4-in. concrete slabs, in panels, placed between 4-in I-beams. Cast iron door frames, with opening 12 by 16 in., are placed on 5-ft. centers. The concrete floor is tamped in place around the frames. The side walls and roof are built of 1-in. angles, expanded metal, and plastered to 2.5 in. thickness. At every 10-ft. distance, pilaster ribs built of 2-in. angles, latticed and plastered, form the wind-bracing and arch roof support.

Fig. 3 shows the bee-hive construction. This chamber is of 253 sq. ft. cross section area. It is built of 2-in. channels, placed 16 in. centers, tied with 1 by 0.125 in. steel strips. The object of the strips is to support the 2-in. channels during erection. No. 27 gauge expanded metal lath was wired to the inside of the channels and the whole plastered to a thickness of 3 in. The inside coat was plastered first with portland cement and sand, one to three, with about 5 per cent lime. The filling between ribs is one to four, and the outside coat one to three.

The above types of dust chamber have been in use over three years at Leadville. Cement and concrete, in conjunction with steel, have been used in Utah, Montana and Arizona, in various types of cross-section. The results show clearly where not to use cement; namely, where condensing sulphur fumes come in contact with the walls, or where moisture collects, forming sulphuric acid. The reason is that portland cement and lime mortar contain calcium hydrate, which takes up sulphur from the fumes, forming calcium sulphate. In condensing chambers, this calcium sulphate takes up water, forming gypsum, which expands and peels off.

In materials of construction it is rather difficult to get something that will stand the action of sulphur fumes perfectly. The lime mortar joints in the old types of brick flues are soon eaten away. The arches become weak and fall down. I noted a sheet steel condensing system, where in one year the No. 12 steel was nearly eaten through. With a view of profiting by past experience, let us consider the

acid proof materials of construction, namely, brick, adobe mortar, fire-clay and acid-proof paint. Also, let us consider at what place

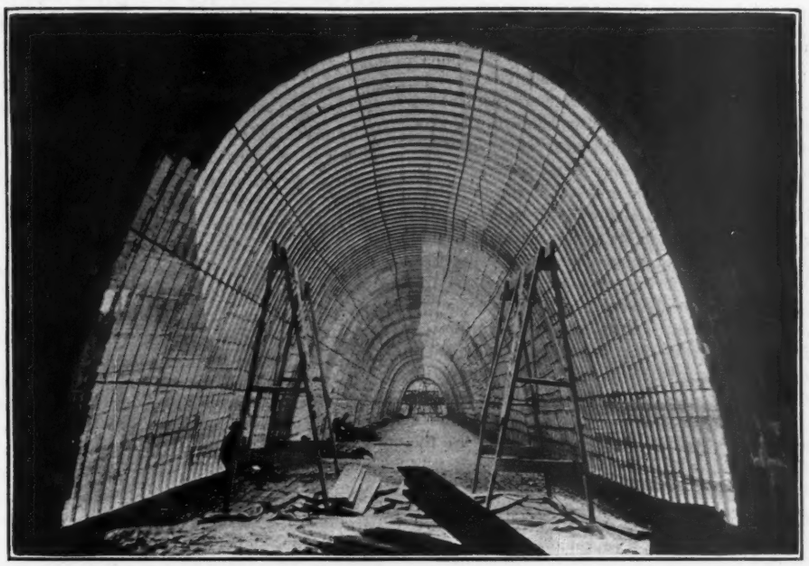


FIG. 3.

in a dust-chamber system are we to take the proper precaution in the use of these materials.

At smelting plants, both copper and lead, it is found that near the blast furnaces the gases remain hot and dry, so that concrete, brick or stone, or steel, can safely be used. Lead blast furnace gases will not injure such construction at a distance of 6 or 8 ft. away from the furnaces. For copper furnaces, roasters or pyritic smelting, concrete or lime mortar construction should be limited to within 200 or 300 ft. of the furnaces.

Fig. 4 shows a type of settling chamber 20 ft. square in the clear, with concrete floor between beams and steel hopper bottom. This chamber is built within 150 ft. distance from the blast furnaces, and is one of the types used at the Shannon Copper Company's plant at Clifton, Arizona. After passing the 200-ft mark, there is no need of expensive hopper design. The amount of flue-dust settled beyond this point is so small that it is a better investment to provide only small side doors through which the dust can be removed. The ideal arrangement is to have a system of condensing chambers, so separated by dampers that either set can be thrown out for a short time for cleaning purposes, and the whole system can be thrown in for best efficiency.

As to cross-section for condensing chambers, I consider that the following will come near to meeting the requirements. One, four and six, concrete foundation; tile drainage; 9-in. brick walls, laid in adobe mortar, pointed on the outside with lime mortar; occasional strips of expanded metal flooring laid in joints; the necessary pilasters to take care of the size of cross-section adopted; the top covered with unpainted corrugated iron, over which is tamped a concrete roof, nearly flat; concrete to contain corrugated bars in accordance with light floor construction; and lastly, the corrugated iron to have two coats of graphite paint on under side.

The above type of roof is used under slightly different conditions over the immense dust chamber of the new Copper Queen smelter at Douglas, Arizona. The paint is an important consideration. Steel work imbedded in concrete should never be painted, but all steel exposed to fumes should be covered by graphite paint. Tests made by the United States Graphite Company show that for stack work the paint, when exposed to acid gases, under as high a temperature as 700° F., will wear well.

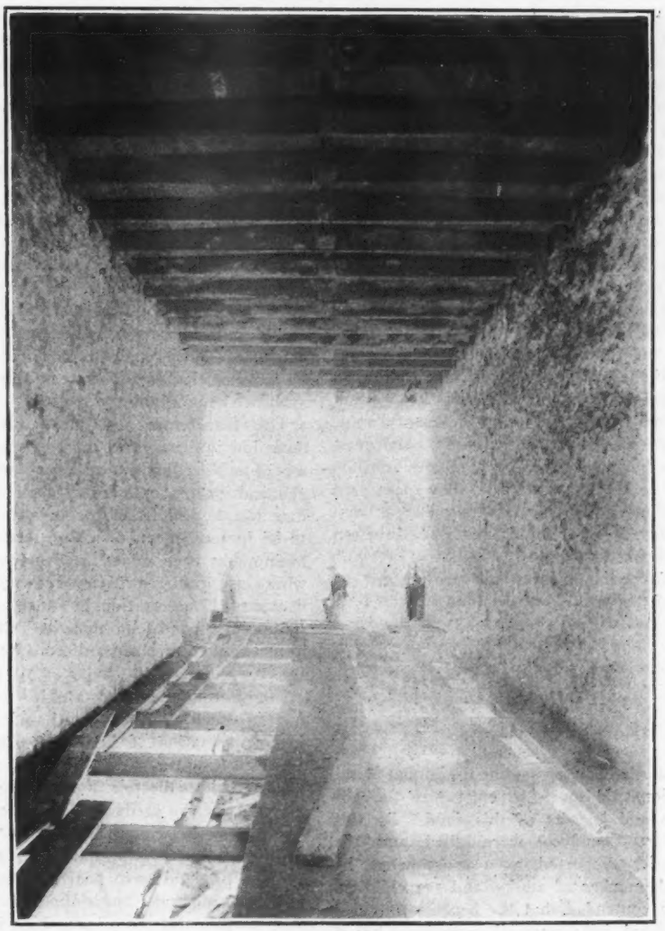


FIG. 4.

MINERS' ACCIDENT FUNDS IN AUSTRALIA.

BY AN OCCASIONAL CORRESPONDENT.

The question of accident pay and compensation to employees or their dependents should be one of constant concern to the mine manager. No matter what care and supervision may be exercised, it seems impossible to foresee and avoid the occurrence of mining accidents. The hazardous nature of the miners' calling, and the necessity for some provision being made for the unfortunate victims of accidents, have long been recognized in many mining communities and numerous accident and benefit schemes are in vogue. In Australia the matter has engaged special attention, and some three and a half years ago the Legislature of New South Wales passed an enactment having for its objects the relief of those injured by mining accidents and the relatives of those killed or injured. The measure, which savored somewhat of an experiment, has been well received and in practice has been found to work smoothly, and to the mutual benefit and advantage of all concerned. The act is compulsorily applied to every mine in or about where an average of 15, or more, persons are employed, also to ore reduction and other works in the neighborhood of mines. Provision is also made for the optional extension of the act to a group of mines employing in the aggregate 15, or more, persons. The local administration of the act is vested in a committee of six for each mine, consisting of the government inspector of mines, three persons

appointed by the employees and two by the owners. This committee has the power of granting allowances and of stopping or varying the same. In placing the fund in the hands of a committee, in which the employees were practically in the majority, it was, at the outset, feared that a general exploitation of the fund might follow. Actual experience, however, has shown the contrary to be the case, and proved that the committees are eager to safeguard the funds. The general fund is administered by a central board of six, representative of mine-owners, employees, and the government. The officers of the local committees, and the members of the board, draw fees on a limited scale out of the general fund, but the administrative salaries and expenses are defrayed by the government.

The contributions toward the fund are made up as follows: The sum of 4½d. per head per week is deducted by the manager from the wages of every person employed; the owner has then to contribute an amount equal to one-half of the sum so deducted, and the government a like sum. During the first year the owners' contributions were estimated on the basis of average daily employment, but as this operated somewhat to the disadvantage of the employees the scheme just outlined was adopted.

The scale of allowances was decided upon, after inquiry into the working of the several accident benefit funds in operation in other parts of the world, and with due regard to the conditions governing mining operations in New South Wales. The following are the benefits:

1. In case of death, an annuity of 8s. per week payable to widow, or if unmarried, to either mother or father, or unmarried sisters (sharing equally) if dependent on deceased; a funeral allowance of £12; an allowance of 2s. 6d. a week for each child until attaining age of 14 years.

2. In case of disablement, an allowance of 12s. per week. If the disability be permanent, an allowance of 2s. 6d. a week for each child until attaining the age of 14 years.

Provision is made in the act for a quinquennial actuarial examination as to the solvency of the fund and for the increase or decrease of the benefits in accordance therewith.

The following statement shows the position of the fund from its inception in January, 1901, to June, 1904: Contributions—By employees, £70,299; by owners, £30,938; State subsidy, £30,840; total, £132,077. The allowances paid were: Funeral, £2,580; fatalities, £8,874; disablements, £27,307; total, £38,761. The invested funds amount to £90,000.

The following illustrations are quoted as typical of the working of the fund:

Class of Mine.	Employees.	Contributions. Owners and government, equal sums.	Total.	Amount expended in relief.
Coal	£1,514	£1,296	£2,810	£493
"	1,318	1,146	2,464	1,163
"	1,791	1,708	3,499	466
Gold	516	486	1,002	312
Copper	1,218	1,077	2,294	715
Silver	6,817	5,982	12,799	3,842

The disastrous explosion at the Mount Rembla colliery did much to emphasize the advantages and benefits of this fund. By this calamity 94 employees were killed, and the beneficiaries supported, as a consequence, by the fund, number 48 adults, and 114 children. It is not contended that the benefits provided by this fund fully meet all necessities, but it is claimed that they materially mitigate the deprivation and suffering otherwise incidental to mining accidents. The provision has also loosened litigation over damages.

TITANIFEROUS IRON ORES.*

By N. P. Hulst.

Although titanium was isolated as a rare element in 1791, it may still be called a rare metal, notwithstanding that it forms 0.33 per cent of the solid crust of the earth and is relatively more abundant than manganese, carbon or sulphur. It is an abundant constituent of many crystalline rocks and is found in the clay beds resulting from their decay; from its afinity for oxygen it is never found native. Pure titanic acid occurs in mineral form in rutile, brookite and anastase; except for these minerals, the most notable percentages of titanic acid are found in association with magnetite. Magnetic titaniferous ores are almost invariably low in phosphorus, and to this is probably due the excellent quality of the iron produced from such ores. The association with magnetite is due to the origin of many magnetite deposits, titaniferous magnetites being practically always associated with igneous rocks, such as gabbros, diorites and serpentines. In the differentiation of igneous magmas there is a tendency toward concentration downward by gravity, when the dissolved matter is specifically heavier than the dissolver; and as magnetite and ilmenite have nearly the same specific gravity it is not strange that they are associated as titaniferous iron ores in rocks of igneous origin.

As the presence of a moderate percentage of titanic acid in an iron ore is considered objectionable, various attempts have been made to eliminate it either by concentration, or by the use of fluxes to produce a liquid slag in melting. Separation by gravity being impossible, owing to the specific gravities of ilmenite and magnetite being so nearly alike, magnetic methods of concentration have been tried, as ilmenite is but slightly magnetic. Careful tests in Canada and elsewhere, however, show that in titaniferous magnetite the titaniferous material is so intimately mixed with magnetite more or less free from titanic acid that very fine crushing is necessary, except possibly for granular titaniferous ores. Hence briquetting would be needed to make material suitable for a furnace charge, and these conditions involve an expense that might make the utilization of such ore unprofitable.

The titaniferous ores now consumed are those low in titanic acid, more of such ore being mined in New Jersey than anywhere else. Mechanical or magnetic concentration to eliminate titanic acid from iron ores is not known to be in use anywhere. More ore high in titanium has been mined in Sweden than anywhere else in the world, but such mining ended in 1902. Concentration by washing was unsuccessfully tried long since at Taberg, where iron was made from titaniferous ore centuries ago.

Titaniferous ores are stated to require more fuel in smelting than non-titaniferous. The fuel consumption of the larger Swedish furnaces smelting titaniferous ores was 275 bushels of charcoal to the ton of iron, while the fuel required for the easily reducible, non-titaniferous ores of the United States is only one-third as much. Attempts at smelting high titanium ores in England gave poor results. Titanate of lime in mineral form is almost infusible. In practice the smelting of ores high in titanium has been found to produce thick, ropy slag, and titanic compounds are formed on the sides of the furnace, reducing the diameter of the hearth, choking the crucible, and even stopping operations. By diluting the slag (using more flux) the titanium may be largely washed out, but it is stated the yield of iron is lessened and the consumption of fuel increased. In New Jersey ores containing but 1 per cent of titanium gave trouble from the relative infusibility of the slag, and the dismantled furnaces in the Adirondacks, Canada and Sweden prove that though iron ores high in titanium can be smelted, the furnaces soon cease to be profitable.

A recent champion of titaniferous ores, A. J. Rossi, as the results of experiments with a 3-ton open-tapped furnace charged with such ores from the Adirondacks, concluded that ores containing 20 per cent titanic acid and 52 to 53 per cent of iron could be smelted in a furnace only 20 ft. high, with blast at 400° F. under a pressure of 16 to 18 oz., with no greater consumption of coke than with ores free from titanium; that the lines of the furnace were not obstructed while using titaniferous ore; that slags containing 30 to 35 per cent of TiO_2 and but 15 per cent of silica, with alumina, lime and magnesia as bases, were perfectly fusible under low heat; that richer ores with less TiO_2 and a blast as hot as 800° would probably give more economical results, and that it is possible to form fusible compound with TiO_2 by adding such fluxes as dolomite, the magnesia combining with alumina and lime to render the titanate or silico-titanate more fluid, in spite of assertions as to the impossibility of tapping slags containing 1 to 2 per cent of TiO_2.

I am not prepared to dispute Mr. Rossi's claims of success in fluxing economically a considerable per cent of TiO_2; and there is no reason to doubt that he can duplicate his work with a large furnace. Yet, though the full record of his experiments was published over eight years ago, iron-masters have not offered to have him repeat his work in one of their modern furnaces. Such experiments would tax the courage of the average furnaceman, who has been brought up to believe a little TiO_2 in an iron ore very bad; and it would be marvellous for the furnaceman to believe that if a little in a furnace mixture is very bad, an abundance would be a blessing. Yet this is what has been demonstrated respecting phosphorus in the basic steel process.

*Abstract of a paper read before the Lake Superior Mining Institute, August, 1904.

DISTILLATION OF METALS.—Experiments carried out by Moissan and O'Farrelley with the aid of the electric furnace show that the usual laws of distillation apply as well to the distillation of mixtures of metals (*Comptes Rendus*, 1904, p. 1,659). Various mixtures were heated in the furnace for different times, and the residues were analyzed. In the case of copper and zinc and copper and cadmium, the zinc and cadmium were completely expelled after short periods of distillation. In the case of copper and lead, the same result was reached, though only after longer distillation, during which the percentage of lead gradually lessened. In the case of copper and tin, some mixtures gradually increased in copper content, some in tin content, and others distilled without change of composition. With mixtures of lead and tin, the lead gradually decreased until pure tin remained. A remarkable character of tin is the wide range of temperature through which the metal remains liquid; while it melts at 226° C., its boiling point is above those of copper and lead.

PIG IRON PRODUCTION IN CANADA.

The American Iron & Steel Association has received direct from the manufacturers the statistics of the production of pig iron in Canada in the first six months of 1904. The figures show a decrease as compared with either of the two halves of 1903, as will be seen by the following table, which gives the production by fuels, in gross tons, in half-yearly periods:

	1903		1904
	First half.	Sec'd half	First half
Coke	123,500	124,405	111,840
Charcoal	9,430	8,083	8,803
Totals	132,930	132,488	120,643

The decrease in production in the first half of 1904 as compared with the first half of 1903 was 12,287 tons, or a little over 9 per cent, and as compared with the second half of 1903 it was 11,845 tons, or a little less than 9 per cent. Of the total production in the first half of 1904, 35,291 tons were basic pig iron, against 69,325 tons in the first half of 1903 and 57,567 tons in the second half of that year. A small quantity of Bessemer pig iron was produced in the second half of 1903, but no Bessemer pig iron was made in the first half of 1903 or the first half of 1904.

The unsold pig iron held by Canadian manufacturers on June 30, 1904, none of which was intended for their own consumption, amounted to 36,868 gross tons, as compared with 19,168 tons on December 31, 1903, and 13,585 tons on June 30, 1903. Of the unsold stocks on June 30, 1904, a little less than 4,000 tons were made with charcoal, the remainder being coke iron.

On June 30, 1904, Canada had 15 completed blast furnaces, of which 6 were in blast and 9 were idle. Of this total 11 were equipped to use coke and 4 to use charcoal. In addition, one coke furnace was being built on June 30, 1904, and one coke and one charcoal furnace were partly erected but work was suspended.

During the first half of 1904 the total number of furnaces in Canada actually in blast for the whole or a part of the period was 10, of which 7 used coke and 3 used charcoal. The number of furnaces idle during the whole period was 5, of which 4 used coke when last in blast and one used charcoal.

The Dominion Iron & Steel Company, of Sydney, N. S., had 3 of its 4 furnaces running during the first six months of 1904, although all 4 were idle on June 30. It expected to blow in 2 of its idle furnaces on August 15.

The Londonderry Iron & Mining Company, of Londonderry, N. S., had one of its 2 furnaces in blast on June 30.

The Nova Scotia Steel & Coal Company, of New Glasgow, N. S., operated its Ferrona furnace, for 180 days during the first six months of 1904. The furnace was idle on June 30, and will not be blown in for some time. The new furnace which the company is erecting at Sydney Mines, Cape Breton, will probably be completed soon. It will be known as the Sydney Mines Furnace and will have an annual capacity of about 75,000 tons of foundry and basic pig iron.

The Canada Iron Furnace Company operated its charcoal furnace at Radnor Forges, P. O., Quebec, for 143 days during the first half of 1904. Its Midland furnace, at Midland, Ontario, which uses coke for fuel, ran for 142 days. Both furnaces were running on June 30.

Messrs. John McDougall & Co., of Montreal, had one of their 2 charcoal furnaces at Drummondville, Quebec, in operation during the whole of the first half of 1904. The idle furnace was blown in on July 1.

The Hamilton Steel & Iron Company, of Hamilton, Ontario, operated its coke furnace for 151 days during the first half of 1904, and was running it on June 30.

The Deseronto Iron Company, of Deseronto, Ontario, operated its charcoal furnace during the whole of the first half of 1904.

IRON ORE PRODUCTION IN 1903.

The report of the United States Geological Survey upon the production of iron ore in 1903, compiled by John Birkinbine, has just been completed. In the year 1903 the quantity of iron ore produced in the United States was 35,019,308 gross tons. This is a decrease of 534,827 gross tons, or about 1.5 per cent, from the maximum of 35,554,135 gross tons in 1902; but the quantity mined in 1903 is the second largest recorded, and is greater than the combined totals of Germany and Luxemburg and of the British Empire (the nearest competitors of the United States) in the year 1902. The data for 1903 for the countries named are not yet available, but the same comparison will probably prove true for that year also. The average iron content of the ore mined in the United States is also higher than that obtained in the two countries mentioned, and therefore the ore can produce a greater amount of pig iron.

The iron ore obtained in 1903 came from 22 States and 2 Territories. Minnesota, Michigan, Alabama, Tennessee, and Wisconsin were the leaders in production. Nevada was added this year to the list of producing States, while Vermont and Montana reported no ore mined in 1903. The production of the leading States was as follows: Minnesota, 15,371,396 tons; Michigan, 10,600,330 tons; Alabama, 3,684,960 tons; Tennessee, 852,704 tons; and Wisconsin, 675,053.

The Lake Superior district stands pre-eminent as a producer of iron ore. In the year 1903 the Mesabi and Vermilion ranges in Minnesota, the Marquette range in Michigan, and the Menominee and Gogebic ranges in Michigan and Wisconsin produced a total of 26,573,271 gross tons. Of this ore the Mesabi range alone produced 51 per cent. In addition to the above-named ranges in the United States, a sixth, the Michipicoten range, was opened in Canada in the year 1900, but its product in 1903, 223,976 gross tons, is not included in the above data.

Of special interest in connection with the production of Wisconsin is the fact that the year 1903 witnessed the initial output of iron ore in the new Baraboo iron range, near the town of Freedom, in the southern part of the State. The production of the Baraboo range in 1903 was a little less than 19,000 tons.

Pennsylvania showed in 1903 a decline of 22 per cent from the total of 1902. This decline is due almost entirely to the diminished output of one of the large mines, the Cornwall Ore Hills, to which Pennsylvania has been mainly indebted for its position as a prominent producer of iron ores. New Jersey, on the other hand, showed an increase of nearly 10 per cent over its 1902 production. The construction of several modern furnaces was the chief cause of the increased output in New Jersey.

Iron ore to the amount of 980,440 gross tons was imported into this country in 1903 from Cuba, Canada, Spain, Newfoundland, Algeria, the United Kingdom, British Columbia, Belgium, and Germany. The total export of iron ore in the year 1903 was 80,611 tons. The greater portion of this went to blast furnaces in the Province of Ontario, Canada.

AMMONIA FROM NEW WELSH COKE OVENS.—During the current year the initial production of sulphate of ammonia in coke ovens using South Wales coal is expected, and should the experiment prove commercially successful there promises to be an extensive business in that active metallurgical district.

CALCINATION OF SPATHIC IRON ORE.—According to C. Lacoisne (*Bulletin* Société d'Encouragement, 1904, p. 360) the spathic ores of western Hungary and Austrian Silesia, containing 35 per cent iron or less, are calcined in shaft kilns of brick cased with sheet iron, which hold about 60 tons and burn about 15 tons per 24 hours. Alternate layers of ore (3,500 kg.) and coke (210 kg.) are charged. A 25-mm. tube passes down the center of the kiln, from which through lateral holes fine jets of water are discharged under pressure horizontally into the furnace. The decomposition of the water by the hot coke and the subsequent combustion of the hydrogen and carbon monoxide are said to result favorably to the calcination process, reducing the consumption of coke from 12 per cent of the weight of the ore to 6 per cent, which is certainly a noteworthy saving.

MINERAL IMPORTS AND EXPORTS OF SPAIN.—Imports of fuel into Spain for the six months ending June 30 were 1,129,405 metric tons of coal and 87,087 tons of coke. Exports of mineral for the half year are reported by the *Revista Minera*, as follows, in metric tons:

	1903.	1904.	Changes.
Iron ore	3,953,909	3,642,594	D. 311,315
Copper ore	542,713	538,794	D. 3,919
Zinc ore	68,349	66,541	D. 1,808
Lead ore	1,451	2,897	I. 1,446
Pyrites	292,688	258,518	D. 34,170
Salt	177,871	203,784	I. 25,913

Exports of metals for the six months were 18,843 tons pig iron, against 20,745 tons in 1903; 14,534 tons of copper, against 14,994 tons; 936 tons of spelter, against 1,038 tons; 87,943 tons of lead, against 76,935 tons last year.

EFFICIENCY OF ROTARY BLOWERS.—The following tests of a blower of the Root type, manufactured by the Adolph Meyer Machine Works of Aerzen, Germany, are reported by *Stahl und Eisen* as having been made at the Mechanical Laboratory of the Charlottenburg Technical School:

Pressure in inches, water.	Power required in h.p.	Volume delivered in cu. ft. per min.	Volumetric efficiency, %.	Speed r.p.m.	Power equivalent of delivered air in h.p.	Mechanical efficiency, %.
15.75	3.45	1,120	96.4	403	2.58	74.8
19.7	4.34	1,110	95.3	403	3.19	73.7
23.6	4.86	1,115	95.3	403	3.85	79.3
27.6	5.25	1,100	93.0	403	4.35	82.8
31.5	5.89	1,080	91.0	405	4.86	82.5
35.4	6.45	1,085	90.4	405	5.47	85.3
39.4	7.31	1,065	88.8	406	5.89	81.0
43.4	7.92	1,065	88.8	407	6.49	82.0
47.3	8.50	1,040	86.1	406	6.93	81.5
51.2	9.12	1,045	83.9	405	7.49	83.2
55.1	9.61	1,000	83.5	398	7.69	80.5
59.1	10.52	1,015	85.0	398	8.40	80.0
63.0	11.07	1,010	83.4	401	8.88	80.3
66.9	11.83	1,010	82.8	403	9.38	79.4
70.9	12.63	1,010	82.1	403	9.86	78.0
74.8	13.12	1,010	82.0	402	10.37	79.0
78.7	13.81	985	79.7	403	10.67	77.0

The power required includes that absorbed in driving the countershaft.

THE ATLANTIC STEAM SHOVEL.

Ten years ago the standard steam shovel weighed 25 tons and carried a dipper of 1.5 cu. yds. capacity. The shovel of to-day weighs 60 to 70 tons and has a dipper of 22.5 to 3.5 cu. yds. Shovels are in use which weigh 90 tons and carry a dipper of 5 cu. yds. capacity. The steam shovel, of which we illustrate the 2.5-yard dipper size, herewith, is a new machine which is being introduced by the Atlantic Equipment Company of New York. It is built by the American Locomotive Company from the designs of A. W. Robinson, and is the result of many years' experience in the design and operation of steam shovels and dredging machines.

The distinguishing feature of this shovel is the direct wire-rope hoist. The friction loss in the chain hoist, to say nothing of the loss due to inertia, amounts to at least 40 per cent, whereas the loss in the case of direct wire rope hoist does not exceed 5 to 10 per cent. In the Atlantic shovel there is but a single room than usual, and is quick and sensitive and does its work without heating. It is operated by steam, so that the operator exerts no effort.

The A-frame is formed of steel bars having forged pin-connections at feet and a cast-steel head. The A-frame is stepped upon the ends of the jack-arm truss in such a way that it forms a continuation of the jack-arms. This type of frame is similar to that first designed by Mr. Robinson in 1892, and has since been widely used. The A-frame head is of new design and arranged so that the three strains intersect in a point.

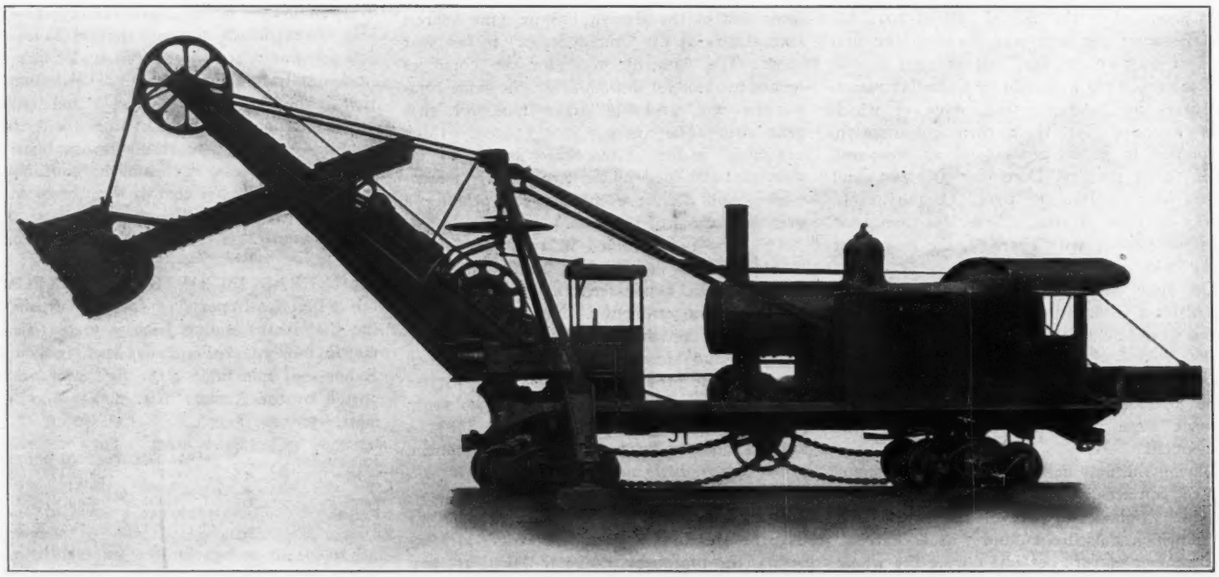
The A-frame can be lowered when required for transportation over the road to 15 ft. (or lower) above the rail. The pin-connections at the foot of the A-frame permit this movement, and the back guys are shifted forward to a connection provided for the purpose. The raising and lowering of the frame can be done by power.

In the boom there is a departure from the loads per minute, and in which all parts are adequate for continuous heavy work and easily accessible.

The entire frame of the engine is of cast steel, in one piece, and forms the foot of the boom and center of the turn-table as well. While the weight of the engines and gearing is not great, it is located on the axis of rotation of the boom and therefore does not appreciably increase the power required for swinging nor interfere with the speed.

The base-plate attached to the car is of cast steel with a revolving collar-bearing of large surface so that it will run a long time without appreciable wear. The feet of the boom are stepped into sockets in this collar-bearing, so that all necessary freedom is allowed.

The main engines are of locomotive type, with outside cylinders. A sheet steel casting is provided for protection. They have a cast-steel frame for both engines in one piece, and steel cross-heads, with all parts easy of access. Steam is carried by a pipe having a double ball-



THE ATLANTIC STEAM SHOVEL.

sheave used for hoisting and this of very large size. This single sheave, besides reducing friction, has the very important advantage of increasing the angle of lead to the bucket. This is a most important feature, as it determines the digging efficiency of the machine. Direct wire-rope hoist has been used successfully by Mr. Robinson for some years in large dipper dredges.

The Atlantic shovel has a special advantage where high lift is required. The construction is such that 4 to 6 ft. more height of lift can be obtained with the same length of boom as compared with other shovels, and it is possible to construct machines with a clear height of lift of 20 ft. which will work at fully as high speed as the lower lift machines of the old type.

Referring to the illustration, it will be seen that the hoisting engines are incorporated in the base of the boom, so that the whole hoisting machinery revolves together. The hoisting machinery is compact and at the same time very strong and easy of access. The drum is very short and of large diameter, and fits easily between the sides of the boom which constitute the frame. The gearing is of steel. The hoisting friction is of novel type, taking up less usual practice by making it with a straight taper deepest at the inner end. This form is the simplest and most direct that can be devised, giving the greatest strength where it is needed and the least weight at the outer end, where there is greatest motion.

The turn-table is built solid with the boom, being made of stiffened steel plates and a rolled rim. The turn-table and boom as a unit have perfect freedom of action, being separate from the revolving collar on the base.

The boom in this shovel is much shorter to accomplish the same height and reach, as compared with other shovels, and is of less weight and can swing more rapidly with less strain to the machine. The principal weight is at the inner end, on the axis of revolution, where it offers no resistance to rapid swinging. In this shovel the hoisting machinery is mounted directly upon the boom so that no guide sheaves are necessary, and the power is applied in the most direct and simple manner and with the least possible loss. A pair of engines, with drum and gearing, is incorporated into the base of the boom that take up very little room and can pull the required amount on the dipper at a speed of five to six dipper and-socket joint on top center, and the exhaust is carried to the smokestack by a pipe through the bottom center.

The hoisting drum is of large diameter, grooved for steel wire rope. There are two parallel ropes, each bearing half the load, equalized round a small sheave or thimble at the dipper. The two ends of the rope are secured by clips at the drum, so that there is really but one rope, and attached in such a way that the rope can be removed and replaced without delay. The cost of renewal of a steel rope 1.5 in. diameter, 108 ft. long, is about $40. An equivalent chain would be 1.375 in. and 125 ft. long and would cost about $134. The ropes will last fully as long as the chain, as there is but one sheave. It will give warning of weakness due to wear before it breaks, while a chain snaps without warning. The hoisting drum is driven by two steel gears and two band friction clutches operated by steam. The clutch and throttle are controlled from the runner's stand on the car.

In the construction of the dipper Mr. Robinson has broken away from conventionality, while retaining all the elements which experience has shown to be sound. He has dis-

carded the bail and sheave and attached the double hoisting rope directly to the back of the dipper in such a way that the lines of force meet in a point situated in the plane of the resistance, or in line with the strain applied to the teeth. The entire back of the dipper is in one piece of cast steel, with lugs formed upon it to receive the dipper-arm, hinges for door, etc. The lip and teeth of the dipper are exceptionally strong and attached so as to be easily renewable.

Independent thrusting engines are employed to feed the dipper to its work. By their use the crane-man has absolute control of the dipper, and can cause it to fill every time while in a proper bank. These engines are solidly built with bed-plates in one piece and well bolted to the boom. The gearing is of steel, and the engines are reversed by means of central valve.

These engines are of new design and are entirely enclosed, with no rocker arms, valve-spindles, etc., exposed.

Independent reversible engines are employed for swinging, duplicate of those on the boom for thrusting, and double-geared to a drum. The drum carries double steel wire ropes on each side, which are connected to the turntable. The propelling motion is performed by the swinging engines, power being transmitted to a cross-shaft underneath the car. This shaft is connected with the forward and rear axles by two chains of great strength, sufficient to slip the wheels. The swinging and propelling shafts are all short and strong, being attached to the main central beams of the car, which are close together.

In this shovel there is room for a first-class locomotive boiler, and the greatest care is bestowed upon its design and workmanship. It is large enough for a locomotive of twice the cylinder capacity, and is, therefore, easy steaming. It is built for a working pressure of 140 lb., which more nearly accords with locomotive practice than has been usual on steam shovels.

In the matter of housing-in the car Mr. Robinson has again been unconventional. The ordinary shovel is covered in like a wooden box-car, which looks well when new, but does not stand the test of service and is not fireproof. In this shovel everything is covered that needs to be covered, and the rest is left off, and no woodwork whatever is employed.

The boiler is covered with magnesia blocks and heavy sheet steel, painted. The working parts of the swinging engines on the car are covered in with steel plate. All gearing is covered by a protecting plate over the teeth, which keeps flying rocks from blasting from getting into them, and is also a protection for the operator. All the remainder of the machinery is weatherproof, as much so as a locomotive. A commodious steel cab is provided for the fireman, containing feed pump and injector, with lockers for tools, and another for the engineer or runner, and also a shelter for the craneman. For situations in which it is necessary to enclose the entire machine it, of course, can be done.

The shovel is mounted on two all-steel trucks of diamond pattern specially designed for the purpose and having a large excess of strength over the requirements. The axles are of best hammered iron with standard axle boxes. The bolster is formed of a steel box-girder composed of two 9-in. I-beams with steel plate top and bottom. The main arch bars are 6 in. wide. The rear truck is fitted with hand brakes.

Coal and water supply is amply provided for by water tanks of large capacity, and a coal platform attached to and projecting from the rear of the shovel. This coal platform is built entirely of steel and is hinged in such a way that it folds up against the rear of the machine when not in use.

The shovel illustrated is working on the New York Central & Hudson River Railroad and frequently loads 10 cars (100 cu. yd.) in 8 minutes. Another is at work on the site for the new Terminal for the Pennsylvania Railroad in New York.

AN ACID PROOF MINE PUMP.

The Jeanesville mine of the Lehigh Valley Coal Company, at Jeanesville, a short distance south of Hazleton, Pa., has been worked for some 40 years. The principal seam, the Mammoth, averages from 20 to 40 ft. thick, and in places runs up to 60 ft. This vein has been practically worked out, and preparations are being made to open the Buck mountain, which carries coal of good quality. During the heavy rain storms in the early spring of 1902 the entire valley in which the mine is situated was flooded by a brook overflowing its dikes, and through a cave-in on the Mammoth vein near the No. 1 slope of the Jeansville mine the mine was completely filled.

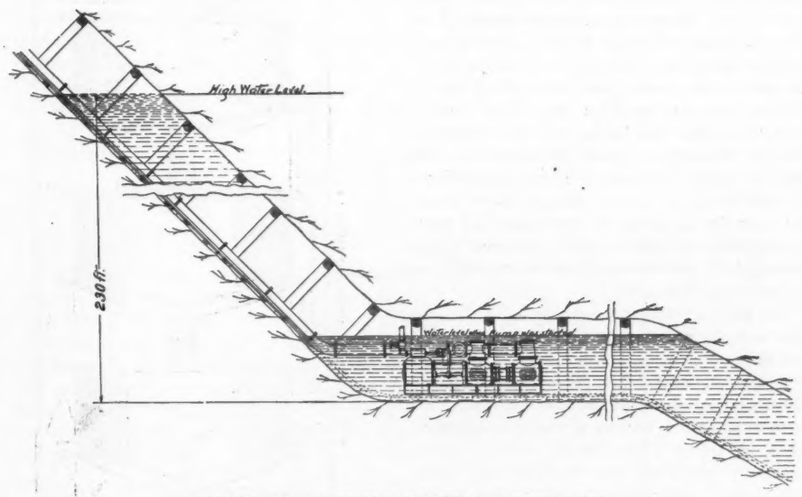


DIAGRAM SHOWING FLOODED PUMP STATION.

At the foot of No. 4 slope, which connects with No. 1, was a duplex plunger-pump with wood-lined water-end, built by the Jeanesville Iron Works Company, which had been in steady operation since it was installed in 1884. During this time it had been handling water that at times averaged 120 grains of free sulphuric acid to the gallon. The accompanying diagram shows the position of the pump and the depth to which it was flooded.

To unwater the mine two Jeanesville pumps were put into slope No. 4, and after about 2½ years of pumping the water was lowered to the second level shown in the cut, and a pump runner swam into the pump room and turned on the steam. The pump, in spite of its having been so long submerged, started work at once, and in a few days the mine was rid of surplus water. Considering the time the pump had been in operation before it was drowned, it is believed that it has established a record for resisting the action of acid mine water.

SPONTANEOUS IGNITION OF COAL.

Alfred O. Doane, in *Engineering News*, August 18, 1904, states that, in order to reduce the danger from heating as much as possible, the following precautions should be observed. The storage bin should be roofed over. No wood should be used in its construction. The depth of the coal should be reduced as much as possible; it is best not to exceed 12 ft. All iron work, including posts, should be protected by concrete against fire and acid water from the coal. It is advisable to have a circulation of air under the bottom and around the sides of the bin or pocket.

As almost all coal will heat to some extent, it is desirable to know that the safe limit be not exceeded. This may be determined by thermometric tests. A simpler way is to drive in ⅝-in. rods at convenient places, allow them to remain a suitable time, then remove and test by the hand. An experienced man can tell by the feel if the coal is dangerously hot. If the temperature of any part of the pile is above 140° F., it is time to take active measures to prevent further heating.

When the coal in the interior of a pile ignites, the heat cokes a layer of coal around the glowing nucleus, which will shed water and make it difficult to quench by playing water on the surface of the pile. A good way is to drive in a pointed 2-in pipe, the lower 3 or 4 ft., perforated with ⅜-in. holes, to the depth of the fire as indicated by the test rod, connect the upper end of the pipe with hose, and force water into the heart of the fire.

HENDERSON PROCESS OF COPPER EXTRACTION.—At wet copper works in Great Britain more difficulty is experienced than in alkali works generally, in keeping the chlorhydric acid gas evolved within due limits, partly because it has not proved convenient to construct the furnaces on the plus-pressure principle, as is usually the case. Dr. Affleck has reported ('Fortieth Alkali Works Report') that by burning a certain proportion of pyrites fines in a special furnace apart, at certain intervals, and mingling the gases with those from the other furnaces, in which the mixture of burnt copper ore with salt is calcined, all excess of chlorine in the gases is reduced, obviating the difficulty of absorption which otherwise arises.

THE CENTRIPACT SCREEN.

The accompanying illustrations show a new screen, for which many advantages are claimed. The inventor, Mr. S. W. Traylor, has called this device the "centripact" screen, for reasons shown below.

The centripact screen depends for its efficiency on centrifugal motion in conjunction with an upward impact—hence the name. It is a slow-speed screen, and is enabled to distribute the material with only a moderate centrifugal force, that would have no effect alone were it not for the upward impacts, 600 per minute, which keep the pulp constantly leaping slightly from the surface of the screen.

The device consists essentially of a dished screen, approximately saucer-shaped, mounted on a vertical shaft, which rotates at a speed of about 30 revolutions per minute. This slow speed provides ample centrifugal force to properly distribute the pulp, only when used in connection with the upward impact. The crushed material is delivered to a feed plate at the center of the screen, and would remain there inert if the screen were simply revolved, as the above speed does not provide sufficient centrifugal force to entirely overcome gravity. However, the moment that the upward impact is used, the ore particles are raised slightly from the surface and by the time the screen has reached its ordinary speed, 30 revolutions, the pulp is fairly alive, and the centrifugal force is distributing it toward the periphery where the over-size is taken off, the under-size passing through the screen, being delivered to the center of the next finer screen when double or triple screens are used.

The mechanism for producing both the impact and the rotary motion is simple, positive and efficient in action, and has been designed to secure the fewest number of moving parts, these being so arranged that it is impossible for them to slip, or to become in any way deranged when in action. The impact motion is obtained by revolving one multiple-faced manganese steel cam against another, thus giving in reality the effect of a succession of cams; by this means all undue wear incident to a single high-speed cam has been reduced to a minimum. The tension required for the impact is obtained from a heavy crucible steel helical spring of the railroad car type. The operating shaft passes downward through a beveled gear by which it, together with the screen, is rotated, the shaft being spliced therein so as to produce a positive rotation and at the same time permit the free vertical motion required for the impact. The head motion is enclosed in a dust-proof case containing oil, all working parts thus operating in oil, ensuring excellent wearing qualities and a minimum of attention.

The centripact screens are built in single, double and triple units, with one, two or three screens operated from one head motion, the accompanying illustration showing a triple-unit screen arranged for wet work. In the case of double or triple-unit screens, the shaft of the second screen screws into the hub of the first and so on. An adjustable spring step-bearing is provided at the bottom to act as a guide, also to supply additional tension as required.

For wet screening, as shown in the accompanying cuts, a pan of sheet steel of the same form as the screen surface is riveted to the screen arms and to the center hub, thus forming a water-tight irrigating dish immediately under the screen. The water coming with the pulp is not lost during the first 6 in., as occurs on other inclined impact screens, and consequently no sprays or additional water are required. Any pulp that will flow contains sufficient water to irrigate itself perfectly on the Traylor screen. This solution of the irrigating problem has been one of the most important factors in the success of the centripact screens for the wet screening of fine pulp. The irrigating pan is omitted in the dry screen, the through product falling directly into the hopper. The housing of the dry screen differs from that of the wet screen in that the launders and hoppers are given a fall of 45°. Centrifugal force has long been recognized as an

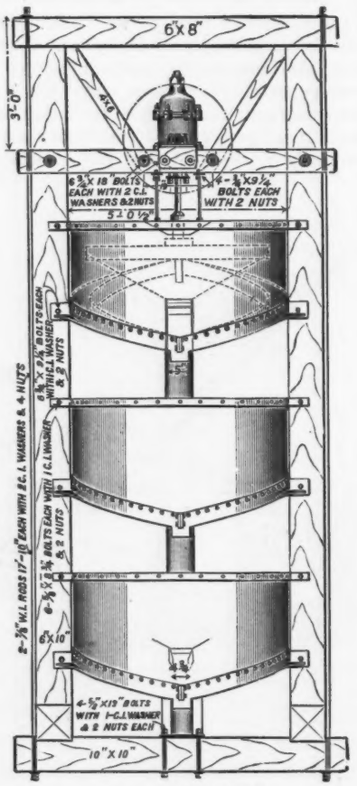

6'X8"
3'-0"
4'X8'
¾" X 18" BOLTS EACH WITH 2 C.I. WASHERS & 2 NUTS
32 0 1/2"
4-¾"X9½" BOLTS EACH WITH 2 NUTS
6-¾"X 8½" BOLTS EACH WITH I C.I. WASHER & 2 NUTS
2-⅞" W.I. RODS 17'-10" EACH WITH 8 C.I. WASHERS & 4 NUTS
6-⅞"X 5½" BOLTS EACH WITH I C.I. WASHER & 2 NUTS
6'X10'
4-⅝"X15" BOLTS WITH I-C.I. WASHER & 2 NUTS EACH
10"X10"

FIG. 1. ELEVATION.

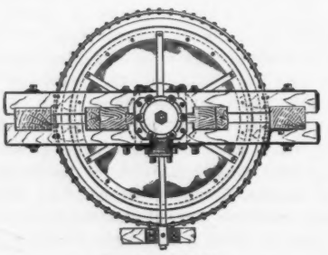


FIG. 3. PLAN.

ideal method of distributing material, but most previous attempts to apply it to screening have been along high-speed lines and without the combination of the upward impact which serves the important part of keeping the screen meshes open and also permits the use of a very moderate centrifugal force. The centrifugal motion not only provides a means of automatic and even distribution of the product to be screened, but enables every inch of the screen surface to constantly do its equal share of the work. This, coupled with the fact that the screen meshes are always open, results in increased capacity over the revolving trommel. There is also an absence of the scouring action noticeable in other screens as a result of the dragging of the pulp. On the centripact screens the particles are projected by leaps or bounds instead of dragging over the surface, and consequently the life of the screen cloth is much increased. This means a considerable saving in expense of screen renewals, particularly where hard, sharp ore is being handled. This economy is further increased when it is borne in mind that only 10 sq. ft. of screen cloth are used on the centripact screen, as against about 100 sq. ft. on the ordinary trommel. On this centripact screen the screen cloth can be changed in five minutes by simply unscrewing the coupling, removing the old cloth and frame bodily, and inserting a new one previously mounted on the frame at the leisure of the millman.

It is claimed that the centripact screens will handle any products, either wet or dry, and from the coarsest up to 100-mesh in fineness. In concentrating mills these screens will deliver an ideal pulp for concentration—classified according to size of particles and not according to their falling weight, as in hydraulic classifi-

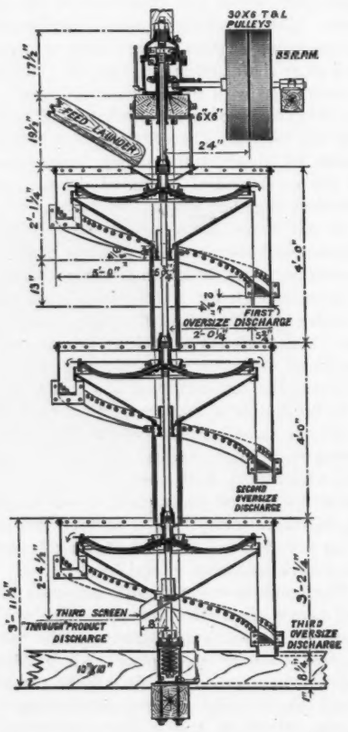


FIG. 2. SECTION.

THE CENTRIPACT SCREEN.

cation. These machines may be extensively utilized with a 100-mesh screen for separating slime and sand for separate treatment in cyanide plants. A considerable number of screens are already being so used, and in addition to screens supplied to Colorado and other Western States, the manufactures have shipped machines to Mexico, and to Cuba for both wet and dry work.

The Traylor centripact screen is the invention of Samuel W. Traylor, for many years one of the constructing engineers for the Colorado Iron Works Company and latterly manager of the Eastern office. The screens are being manufactured by the Traylor Engineering Company, New York.

ELECTRIC EQUIPMENT AT A SCOTCH COLLIERY.

At the recent annual meeting of the Mining Institute of Scotland, Wm. Smith described the power equipment at Houldsworth colliery, which includes a Parsons steam turbine, the first erected for colliery use in Scotland. This turbine, of the latest parallel compound type, adapted for the full range of expansion, from the initial pressure of 100 lb. to the condenser pressure, is coupled direct to a continuous-current dynamo giving an output of 200 k.w. at 500 volts and 3,500 revolutions. Lubricant is forced to all bearings, working from the turbine shaft, these bearings being connected together and to the oil reservoir by pipes. The centrifugal governor is arranged to maintain a constant speed, and is fitted with hand-regulating gear by which the speed may be varied 10 per cent up or down while the machine is running. The dynamo is compound-wound, and of ample size to allow running over long periods without undue heating. The electric current is conveyed to the shaft bottom by vulcanized cables armored with two layers of galvanized wire. They are supported in the shaft by pitch-pine cleats, 6 ft. long by 12 in. wide, having a groove narrow enough to grip the cable firmly, fixed to the buntons at intervals of 120 ft.

At present the current from the turbine is taken to a Riedler pump at the shaft bottom, and to a small three-throw pump. This takes up less than half the power available, and that in reserve will be used to duplicate the shaft pump or for haulage purposes.

The Riedler pump raises 150 gal. per minute against a head of 1,280 ft. The shaft is 1,250 ft. deep, but 30 ft. is added to the head when the water is forced to a pond supplying the condenser. The pump plunger is 3 13-16 in. in diameter, with a stroke of 15 in., and runs at a speed of 120 revolutions per minute. It is driven by six cotton ropes, 1 3-8 in. in diameter, from a Westinghouse shunt-wound motor of 90 brake-h.p., running at 500 revolutions per minute. The ratio of the drive is 4 to 1. It has also a charge for the air-vessels, by-pass valves, and a spring relief valve set to open at a pressure slightly in excess of the statical pressure of the column. The discharge column consists of steel pipes 9 in. in diameter, and 3-8 in. thick, screwed and fitted with cast-steel flanges. This column was made of sufficient size to allow of the pump being duplicated. The three-throw pump has plungers 4.5 in. in diameter, and 9 in. stroke to deliver 50 gal. per minute against a head of 600 ft. It is driven by belt from a motor of 15 brake-horsepower.

"SHERARDISING."—This is a new process of coating iron or steel and other metals with zinc. The iron or steel, cleaned of scale and oxide, are enclosed in an air-tight iron receptacle, lined with graphite and charged with zinc dust. Air is exhausted from the receptacle, or about 3 per cent of very finely divided carbon is added to the zinc dust, to prevent the formation of too much zinc oxide. The receptacle is then heated to 500 to 600° F. for a few hours, during which a coating of zinc is formed on the iron or steel, its thickness depending upon the temperature and time. Advantages over the ordinary process of galvanizing are claimed. The process is said to be also applicable to the coating of aluminum and copper with zinc.

RECENT LITERATURE ON ECONOMIC GEOLOGY. XXVIII—IRON ORES AND MOLYBDENITE.

By Edwin C. Eckel.

'Molybdenite at Crown Point, Washington.' By A. R. Crook. *Bulletin,* Geological Society of America, Vol. 15, pp. 283-288. 1904.

Description of an interesting molybdenite locality, from which all the United States production (12 tons per year!) is obtained. Considerable data are also given on the general occurrence and associations of molybdenite.

The deposit described is located at Crown Point, Chelan county, Washington. The molybdenite occurs in a practically horizontal quartz vein, out-cropping for several hundred feet along the nearly perpendicular face of a granite cliff. The country rock is a medium to fine-grained, greenish gray biotite granite, the feldspars of which are partly altered to kaolin, while the micas are in process of chloritization. No molybdenite occurs in this granite itself. The ore in the quartz vein appears as crystals and flakes of varying size, occurring in small seams several inches in thickness, which extend in all directions through the quartz vein, from side to side.

Two adits have been driven into the cliff, one extending 195 feet toward the northeast, and the other 80 feet westerly. There are something more than 100 ft. of open workings.

'Economic Products of St. Lawrence County, New York.' By W. N. Logan. *Twenty-Second Annual Report,* New York State Geologist, pp. 118-124.

Contains brief notes on the red hematites of this region. Concerning their geologic relations, Mr. Logan says: "The ore occurs in beds which are constricted in places, forming lens-shaped masses. The beds are tilted, and the ore is always richest in the trough of the lenticular mass. The age of the rocks I have not determined, though I think they are later than Grenville."

'Notes on the Economic Geology of Oneida County, New York.' By C. H. Smyth, Jr. *Twenty-second Annual Report,* New York State Geologist, pp. 115-117.

Brief notes on the present status of the Clinton oölitic ores of Oneida county now utilized both for iron and for mineral paint. In 1902 about 13,800 tons of ore were mined for the furnaces, while 2,925 tons were used at the paint works.

'Notes on the Coal and Iron Fields of Southeastern Shansi, China.' By W. H. Shockley. *Transactions,* American Institute of Mining Engineers, advance reprint, 31 pp. 1904.

Description of an important iron and coal producing area, with much local detail regarding mines, iron works, etc. The iron production of the province is estimated at 50,000 tons per year.

The iron ores are said to be mainly limonites and hematites, occurring in Carboniferous shales and sandstones, in nodular form. These nodules usually vary from a few pounds to several hundred pounds in weight, though masses of several tons weight are said to have been found. Sometimes there are several layers of these nodules; at others, only a single stratum. Iron ores also occur in beds varying from a few inches to a foot or so in thickness, though traditions of 20-foot beds are quoted. The ore is a non-bessemer ore, carrying 76.97 to 65 per cent ferric oxide; 8.13 to 17.57 silica and alumina; 0.57 to 1,076 phosphorus pentoxide, and 0.074 to 0.016 sulphur.

BOOKS REVIEWED.

Transactions of the American Electrochemical Society. Volume V. 1904. Philadelphia; American Electrochemical Society. Pages, 284; illustrated. Price, $3.

Papers of especial metallurgical interest comprised in this volume are: 'The Economic Balance in Electrolytic Copper Refining'—Addicks; 'Determinations of the Reduction Temperature of Zinc Oxide'—Johnson; 'Electric Smelting Experiments for the Manufacture of Ferro-nickel from Pyrrhotite'—Sjöstedt. The volume contains numerous other papers of interest, but of less practical value.

The Metric Fallacy. By Frederick A. Halsey. And *The Metric Failure in the Textile Industry.* By Samuel S. Dale. New York, 1904 The D. Van Nostrand Company. Pages, 231. Price, $1.

This book is intended to explode the theory that the introduction of the metric system into the United States would be an advantage. The reviewer is of the opinion that it will prove a good fuse and the explosion may follow in due time. It is proper to remark, however, that he has long been of the author's party. Seriously, the book ought to be read carefully by every metric advocate. I think it will make converts from what some of us pronounce a fallacy. Anyway it will be found interesting reading.

W. R. I.

Dynamo-Electric Machinery. Volume I. Continuous Current Machines. By Silvanus P. Thompson, Seventh Edition, 1904. New York: Spon & Chamberlain. London: E. & F. N. Spon, Ltd. Pages, 984; illustrated. Price, $7.50.

The last English edition (the fifth) of this famous work appeared in 1896. The sixth edition, published only in America, differed merely in the addition of a supplement relating to American machines. The great development in the science and art of electrical engineering since that time has of course necessitated the presentation of practically a new treatise in the present edition. So much has the subject grown, indeed, that it has now become necessary to divide the work into two parts. The volume now before us deals only with machinery for continuous currents. Alternating current machinery is to be treated in the second volume, which is already in the press.

The long delay in publishing the first volume is explained in an interesting note in the author's preface. It was occasioned by a libel suit "brought against the author on account mainly of statements which have appeared substantially without change in every edition of this book since 1884."

The character of the great treatise of this distinguished author needs no further explanation. It is one of the classics of electrical engineering. The present edition brings it up to date, or as nearly so as any work of its kind can be. It is to be regretted that the publishers do not see fit to bring out such a work in a better mechanical style.

Static Electricity. By Hobart Mason. New York; the McGraw Publishing Company. Pages, 155; illustrated. Price, $2.

This book is claimed to be only a compilation of the fragmentary and scattered information pertaining to its subject, but while that may be so, probably is so, the data is so well digested and properly presented to the reader,

that the author is entitled to be considered more than a mere compiler.

The book comprises six chapters: I, General Phenomena; II, The Electrostatic Field; III, Capacity; IV, Experimental Measurement of Capacity; V, Instruments Used in Electrostatics; VI, High Potential Static Generators. There is also an Appendix, giving tables of electrostatic units.

A book on this subject has been needed, because a knowledge of static electricity is becoming important in some branches of engineering and there has not heretofore been any book relating to it. The matter is of especial interest to us in view of the application of static electricity to the separation of ores, which has already become a commercially successful process. Mr. Mason has taken up the subject rather from the standpoint of the physicist than of the engineer, and his work therefore falls short of what we should like to have. We hope he will extend its scope in a subsequent edition. In the meanwhile his work may be accepted as a good and useful treatise from the scientific side.

BOOKS RECEIVED.

In sending books for notices will publishers, for their own sake and for that of book buyers, give the retail price? These notices do not supersede review in a subsequent issue of the JOURNAL.

The Tropenas Converter Steel Process. New York; published by Powell & Colné. Pages, 28; illustrated.

Ontario. Report of the Bureau of Mines. 1904. *Part I.* Thomas W. Gibson, Director. Toronto, Ont.; Public Printer. Pages, 256; with maps and illiustrations.

West Virginia Geological Survey. Volume I,A. Petroleum and Natural Gas. Precise Levels. By I. C. White, State Geologist. Morgantown, W. Va.; printed for the Survey. Pages, 640.

Directory to the Iron and Steel Works of the United States. Sixteenth Edition; Corrected to August 1, 1904. Compiled by the American Iron & Steel Association, James M. Swank, General Manager. Philadelphia; the American Iron & Steel Association. Pages, 464. Price, $10.

California State Mining Bureau. Bulletin No. 32. Production and Use of Petroleum in California. Prepared by Paul W. Prutzman, under supervision of Lewis E. Anbury, State Mineralogist. Sacramento, Cal.; State Printing Bureau. Pages, 232; with maps and illustrations.

The Extension of the Witwatersrand Beds Eastward under the Dolomite and the Ecca Series of the Southern Transvaal. By Frederick H. Hatch. Johannesburg, Transvaal; reprinted from *Transactions* of the Geological Society of South Africa. Pages, 16; with 4 plates.

United States Geological Survey. Production of Asbestos in 1903. By Joseph Hyde Pratt. Pages, 16. *Production of Iron Ores in* 1903. By John Birkinbine. Pages, 38. *Production of Monazite and Zircon in* 1903. By Joseph Hyde Pratt. Pages, 12. *Production of Salt in* 1903. By Edmund Otis Hovey. Pages, 18. *Production of Talc and Soapstone in* 1903. By Joseph Hyde Pratt. Pages, 14. Washington, 1904; Government Printing Office.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

Mining in the Zaragoza District, Colombia—A Correction.

Sir.—I would like to correct the impression conveyed by your correspondent at Zaragoza, Colombia, in your issue of July 21.

I am not connected with any of the companies mentioned except in so far as I am plaintiff and the Bertha and Codero companies defendants in a suit for wages and breach of contract. Full details as to the methods of several companies on the Nechi I will submit to you as soon as my proofs are in proper shape.

Of the properties mentioned by your correspondent, the Santa Margarita received the attention of two engineers recently—Dr. Homer S. Derr, who is now suing the company, and Mr. McCormick, who resigned from the company's employ immediately after his examination of the property. The Santa Barbara was closed down in the latter part of April, the Quiebra (misprinted Sinebra) in June, and the Tortugeros recently. Thus six of the eight properties mentioned are hardly booming.

The details of the plan now being adopted by several of the companies of pumping against the bank direct with centrifugal pumps at undetermined distances from water would hardly interest engineers.

Mr. John B. Dougherty has a property at Caseri about fifty miles from your correspondent, and I would suggest to him that he investigate the careful manner in which that property has been surveyed and examined and also compare the steam shovel there with a centrifugal pump as a means of handling compact gravel under the prevailing conditions of no head and no dump. A description of this property would be of far more interest than the list of undeveloped prospects which he gave.

EDWARD H. EMERSON.

New York, Aug. 19, 1904.

Labor Conditions in Colorado.

The Editor:

Sir.—I have read with interest Mr. Lawrence's article on the labor conditions in Colorado, published in the ENGINEERING AND MINING JOURNAL, of June 30 last, and also the editorial comment on this article.

Because of the prominence of the JOURNAL among mining publications, I cannot but feel that this editorial is unfortunate, in that it treats lightly of a subject of much importance. The matter it dwells on particularly is the deportation of members of the miners' union from Colorado, and to prove the illegality of the proceeding, reduces it to an absurdity by suggesting that the republicans have just as much right to deport the democrats from the country.

It seems to me that the fact to realize in regard to Colorado is, that a state of disturbance bordering on warfare exists, and that the vital issue is not the means that it has been found necessary to employ to restore order, but the cause of these disturbances and the principles that are being fought for. Methods of warfare hardly have their origin in courts of law, and if, as a last resort, it has been found necessary to affect a general deportation of miners from the district in order to get rid of the lawless element, it must be understood that this act was made necessary by deeds of violence and murders that in brutality and degradation rival the history of Indian warfare.

It is not my purpose to discuss the labor question more than to mention what seem to be the important issues of the present trouble in Colorado. These issues are the principles that the Western Federation of Miners are fighting for and the means they are using to strengthen their organization. They should be thoroughly investigated and the facts made public.

To refer to the principles of the Federation, I will quote Mr. William Haywood, secretary and treasurer of the Western Federation of Miners, an interview with whom was published in the New York *Herald* of August 11, 1904. He says: "We are socialists. The principles of socialism are the principles of our organization throughout the mountains. We believe in an aggressive campaign all along the line for uplifting of labor and the people in general. Here is one of our cards of membership; you will see printed upon the back of it in red ink, our creed, 'Labor produces wealth, wealth belongs to the producer thereof.'"

The ultimate purpose of the Western Federation in Colorado and elsewhere is, then, the possession of the Government and the mining resources, and, if the same process of reasoning be adopted as in the editorial above mentioned, the logical outcome of a victory of the miners' union in Colorado would be the complete possession by it finally of the Government of the United States and all its resources.

In regard to the methods used by the Western Federation to strengthen their organization, they involve one vital principle and are much the same as those employed by other labor organizations with the difference that these methods are much exaggerated in the Federation owing to the character of many of their leaders and to the opportunities offered by isolated mining camps for acts of lawlessness. This vital principle which the Western Federation of Miners are able to apply so successfully, is that the Federation denies the supposedly free American miner the right to work unless he be a member of their organization, and that they force all miners to join their ranks wherever they are able to do so.

Colorado must be regarded as a test case of these issues. The lawlessness in the State during the past year shows that the conditions there must be radically wrong, and the facts, therefore, without prejudice, should be known, and the moral support of the public given to those in the right in the present controversy. In view of its far-reaching importance, should not the solution of the problem be aided by the appointment of a committee of men of national reputation to investigate the facts without prejudice and without political bias and lay them before the public?

JOHN SEWARD.

New York, Aug. 24, 1904.

Possibilities in the Exploitation of "Antigua" Mines in Mexico.

Sir.—The recent re-encountering of bonanza ore in the Jesus Maria mine of San Jose de Gracia, Sinaloa, Mexico, after said mine was supposedly worked out by both Mexican and American companies and abandoned, brings up a phase in the exploitation of Mexican mines that deserves especial attention from

the mining world at large. Barring the original Aztec or Toltec Indian, of whose mining ability we have but little authentic information, the first miner of Mexico was the *antiguo,* who was primarily the Spaniard, and following closely came the Mexican. Of the ability of these early people there can be no doubt. The dumps of their numerous mines, situated in almost every State of the Republic of Mexico, their slag piles, the ruins of their haciendas for the beneficiating of ores, all testify in evidence of their geological and metallurgical knowledge.

Wherever there was ore in paying quantities, there you will find the old mines and prospect of the *antiguo,* as I will call the early Spaniard and Mexican. In fact, it is safe to state that fully 90 per cent of the producing properties of Mexico to-day are *antiguas;* in other words, mines that were not virgin when acquired by their owners, but had been worked or explored previously by these ancient people, as for example the mines of La Cananea and Minas Prietas of Sonora, Batopilas of Chihuahua, Mapimi of Durango, Valencia of Guanajuato, Tajo of Sinaloa, and many others.

But the fact that hundreds of these ancient mines have been abandoned by the original exploiter and operator, and subsequently reopened at a profit, often after a lapse of hundreds of years, is sufficient proof of the limitations of the *antiguo* miner in comparison with our modern mining methods. To be sure, in working free-milling silver-gold properties or in silver-gold smelting propositions, where the precious metals could first be collected in a lead bullion, and the silver-gold contents be recovered by cupellation, the *antiguo* could probably operate profitably as low a grade of mine as we can at the present time, for to offset our intricate mechanical devices, greater chemical, geologic, and economic mining knowledge, he had in many instances slave, or peon labor, paid at such a low wage rate as to more than compensate the advantages of scientific research. But in the milling and smelting of refractory ores, and particularly the milling of refractory gold ores, the *antiguo* was palpably deficient. In the free-milling oxidized zone, where the gold was susceptible to amalgamation with mercury, he was at home; but when the ore passed into the refractory sulphide zone, necessitating a knowledge of pyritic smelting, cyaniding, chlorination, concentration, etc., the ancient miner was compelled to abandon his property. A very small flow of water would also seriously interfere with his mining, if it did not cause a suspension of operations, as the hoisting apparatus of the *antiguo* was in many instances the human animal with his leathern bag or *zirron,* which was used to convey the ore to the surface, and a flow of water that could easily be handled with a small pump would be an impossibility with the primitive apparatus at the command of these old miners. As a surface prospector he could not be excelled, nothing escaped his attention; an expert with the *cuchara* (horn-spoon), a rough mineralogist being particularly proficient in determining the silver minerals at sight, he was of incalculable benefit in detecting those surface indications that show a mine.

But as an underground miner he was poor, often confusing faults with horses, and sinking when he should have drifted on the fault plane.

We have instances of this in some of the lead mines of Coahuila, and more particularly in the Bufa mine, Sahuaripa district, Sonora, Mexico, the owner of which owed his wealth to his ability to pick up the faulted ore-body where lost by the ancients. Taking all of these facts into consideration, it is to be wondered at why these *antigua* mines have been overlooked by the great majority of exploration companies as long as they have, in view of the successes in the past in this direction.

Gold *antigua* mines are to be found on the western slope of the Sierra Madres, in the States of Sonora, Chihuahua, Durango, Sinaloa, Jalisco, etc., where only the oxidized ore has been extracted.

There is a reasonable chance of encountering ore in some of these properties, and with the advent of railroads and improved facilities for transportation in this heretofore rather inaccessible country, the western slope of the Sierra Madres is bound to attract the attention that it deserves.

HAROLD MCLEOD COBB.

Guanacevi, Durango, Mexico, Aug. 11, 1904.

ALUMINUM CONDUCTORS.

In a paper read before the Canadian Electrical Association, Roderick J. Parke contributes some valuable information relating to the use of aluminum for electrical conductors. As compared with copper, the cost of transportation and erection of aluminum conductors is less, the durability greater and the cost of maintenance less; but these advantages are counterbalanced by difficulty in making joints, great sag due to large co-efficient of expansion and insufficient strength of the wires in sizes ordinarily used for telegraph and telephone lines. The following data are of assistance in showing the relative merits of commercial aluminum and commercial (hard drawn) copper, of sizes ordinarily used for conductors:

	Aluminum.	Copper.
Specific gravity	2.68	8.93
Conductivity	62.00	97.00
Tensile strength (per sq. in.)	28,000	45,000
Cross-section for equal resistance	1.56	1
Diameter for equal resistance	1.25	1
Weight for equal resistance	0.47	1
Tensile strength for equal resistance	0.96	1
Price for equal cost	2.13	1

The difficulty of soldering aluminum is well known, and while it can be done, the operation is so difficult that in most cases unsoldered joints are preferable. For joining aluminum wires smaller than No. 0000 (B. & S. gauge), the two ends are inserted into a piece of flattened tube and the tube given 2.5 twists by means of two pairs of ordinary wire connectors. Larger sizes can be conveniently joined by means of the ordinary dovetailed splice, by means of terminals compressed on the ends at the factory, or by inserting the ends into a cast sleeve and compressing the latter in a portable press.

MANGANESE ORE IN 1903.—According to the statistics compiled for the Geological Survey by Mr. John Birkinbine, there was a large decrease in the output of manganese ore in the United States last year. The production amounted to only 2,825 long tons, valued at $25,335, against 16,477 long tons, valued at $177,911, in 1902. This shows a decline of 83 per cent, but as the figures given for 1902 include some 9,000 tons of ore that were erroneously reported, the absolute decrease was less than that indicated by the above totals. Of the output last year Virginia contributed 1,801 tons; Georgia 500 tons; Utah 483 tons; South Carolina and California the remainder.

ABSTRACTS OF OFFICIAL REPORTS.

St. John del Rey Mining Company.

This London company operates the Morro Velho, the largest, and one of the oldest gold mines in Brazil. The report is for the year ending February 29, 1904. The mine has a long and interesting history. The peculiar situation of the deposit and the method of working are shown in the accompanying section, reproduced from a map given in the report.

The capital account shows £546,265 stock issued; £117,210 in 7 per cent debenture bonds; and a reserve, or surplus capital, account amounting to £65,000 in all.

The mine statement shows 156,158 tons of rock raised from the mine, of which 10,677 tons, or 7 per cent, were rejected as waste. There were 145,481 tons sent to the mill, which yielded 87,107 oz. bullion, equal to 68.562 oz. fine gold; an average of 0.06 oz. bullion, or 0.47 oz. fine gold, per ton. Of this yield 76 per cent was obtained in the mill, and 24 per cent from the tailings, by a second process, the details of which are not given.

The earnings and expenses are given below, as stated in sterling; the averages per ton are reduced to United States currency, to permit comparisons:

	Amount	Per ton.
Bullion returns	£297,496	$9.60
Working costs in Brazil	£209,453	$6.66
Royalty, insurance and transport	15,536	0.51
Development	9,129	0.30
London expenses	4,008	0.13
Total expenses	£238,126	$7.60
Net earnings	£59,370	$2.00

From this surplus, appropriations were made as follows: Interest on bonds and taxes, £10,525; dividends, 1s. per share, and income tax, £28,566; carried to suspense capital account, £19,909; total, £59,000, leaving a balance of £370 forward to current year.

The directors' report says: "Although the exceptionally low rainfall of the past year caused a heavy increase in the working cost—£14,518 having been spent in fuel for the steam engines—the output from the mine was fully maintained, and the mills and reduction plant were supplied with sufficient power to treat the whole of the mineral by the assistance of the steam engines, inclusive of the additional power obtained by erecting the 300-h. p. corliss engine. The capital cost involved in the purchase and erection of this engine and plant amounted to £13,698. The E shaft was completed and connected by a tunnel to the mineral formation in No. 12 horizon; the total cost of this shaft with the necessary hauling plant and communicating tunnels to horizons 10, 11, and 12 to March 31 is £26,896.

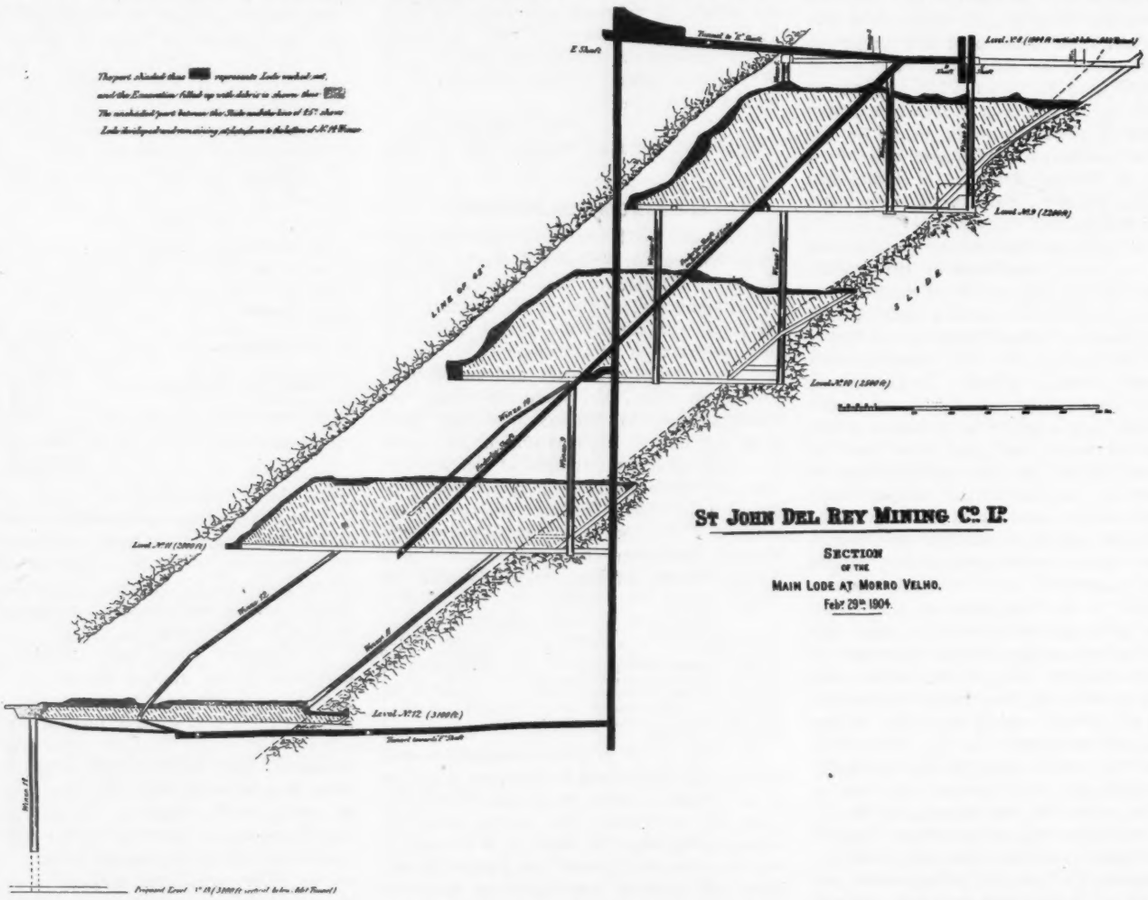
"The adit that is to continue from shaft E to shaft F has been commenced, and no time will be lost in sinking the shaft when the required point is reached. F shaft will be sunk a similar depth to that of E shaft, 1,200 ft., and will communicate with horizons 13, 14, 15 and 16 when opened out at successive intervals of 300 ft. vertical. Shafts C and D are parallel shafts, each sunk 2,100 ft. below the adit in the hard metamorphic country rock. Shaft E and the tunnels, as also the tunnel to shaft F, and the shaft itself, when sunk, will all likewise be in the country rock, thus ensuring at all times safe access to and from the mine.

"The sum of £65,000 has been taken from the profits during the three years ended February 29 last, toward meeting the capital ex-

penditure of that period; the amount so transferred has not been quite sufficient to meet the capital expenditure, and as in addition to the further amount required for the F shaft and tunnels, a large sum will have to be provided for the outlay to bring the power of the Peixe river falls to Morro Velho, as also to provide for paying off, as they become due, the bonds that the holders may not feel disposed to renew, the directors have decided to ask the shareholders to sanction the creating of 100,000 new £1 preference shares.

"Horizon 12 shows considerable improvement over the horizon above, and the mineral for the past year has given 40s. per ton, with 7 per cent rejection, as against 38s. 3d. for the previous year, with 10 per cent rejection. Winze No. 14 from horizon 12 has been sunk the required depth for opening out horizon 13. The area and quality of the lode as it is opened out will be watched with deep interest by all concerned in the continued prosperity of the company. Late despatches received are very encouraging.

"Superintendent Chalmers' report deals with the preliminary work in connection with his Peixe scheme; he estimates the further cost to obtain 500 effective h.p. in the first instance at £31,000. The total power obtainable from the Peixe river is estimated by him at 3,000 h.p. when transmitted to Morro Velho, and will be sufficient to continue the working of the mine for a very long period of time. The heavy cost of steam power—more than 10 times that of transmitted electrical force—proves from past experience the necessity of pushing forward the first portion of this work with the least possible delay. The company has in operation already four smaller systems of electrically transmitted power, and the whole of the available direct water supply for many miles around the mine is brought into operation by over thirty miles of channels."



QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc., preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Bismuth Ore.—Will you kindly inform me as to the value and markets for bismuth ore?—W. F. M.

Answer.—The value of the ore depends upon its character and content in metallic bismuth. As a rule it is sold at so much per unit, the basis price being regulated by the market value of the metal.

In the United States the average selling price ranges from $8 to $11 per unit, with allowance for any gold and silver present. The market is practically controlled by two concerns, Johnson, Matthey & Company, Ltd., of London, England, and the Saxon government. There are no smelters of bismuth ore in the United States.

Pyrite.—There is a large deposit of black carbonaceous slate here that carries sufficient pyrite to make the whole mass assay 15 per cent in sulphur. The deposit can be easily and cheaply worked. Has it any value as a commercial source of sulphur?—C. A.

Answer.—It is impossible to give a definite answer to your inquiry without knowing something as to the local conditions. As you say, however, that the material carries only 15 per cent sulphur or less than 30 per cent pyrite, evidently it could not be used directly for commercial purposes. Practically all of the pyrite mined in this country is consumed in the manufacture of acids, and to be of value, ordinarily, it must contain 44 or 45 per cent sulphur. In some cases the crude ore is subjected to concentration, in order to bring up the sulphur content. We know of no instance, however, where this is being done with such low-grade material as you mention. Whether it can be done commercially depends on local factors of which we are not qualified to form an opinion.

LITHIUM IN 1903.—The output of lithium minerals in the United States in 1903, according to Mr. Joseph Hyde Pratt, amounted to 1,155 short tons, valued at $23,425, as compared with 1,245 short tons, valued at $25,750 in 1902. The production includes lepidolite, spodumene and amblygonite, and was obtained entirely from the deposits at Pala, in San Diego county, California, and in the Black Hills, South Dakota.

FLUORSPAR PRODUCTION.—In his report to the Geological Survey, Mr. Joseph Hyde Pratt states the production of fluorspar in 1903 amounted to 42,523 short tons, valued at $213,617, against 48,018 short tons, valued at $271,832, in the previous year. The falling off, as shown by these figures, was due partly to the depression in the iron and steel industries, and partly to the fact that considerable stocks of fluorspar were left over from the previous year. Kentucky was the largest producer, followed by Illinois, Tennessee and Arizona.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

AUTHORITY FROM EMPLOYER NOT INFERRED OR RESUMED.—Where neither express authority to one employee to direct another, nor knowledge of authority assumed by such employee brought home to the employer, or to any one standing in the relation of vice-principal, is shown, consent on the part of the employer to the exercise by such employee of such authority will not support an inference or presumption of authority to such employee to direct and control the other.—Texas & Pacific Coal Company v. Manning (78 *Southwestern Reporter*, 545); Court of Civil Appeals of Texas.

WHAT CONSTITUTES GROSS NEGLIGENCE ON THE PART OF MILL SUPERINTENDENT.—Where one employed in a mining mill as a repairman was informed by the superintendent that he was going to shut down the mill for half an hour for repairs, as was the custom when repairs were being made, and requested such party to perform that duty, and the latter, while so engaged, leaped over a belt to tighten a cap, when the superintendent gave the order to start the mill, without the customary warning, and such party was injured, it was held to be gross negligence on the part of the superintendent, immediately causing the injury, and the company was held responsible. Mathews v. Daly West Mining Company (75 *Pacific Reporter*, 722); Supreme Court of Utah.

REFERENCE TO PATENTED CLAIM IS SUFFICIENT AS REFERRING TO PERMANENT OBJECT OR MONUMENT.—Under the law of Colorado (Mill's Code, section 3162) providing that the re-locator of an abandoned claim "may" sink the original shaft 10 ft. deeper than it was at the time of the abandonment, "may" is used in a permissive, not a mandatory sense. A location certificate describing the claim as "Beginning at Corner No. 1, being the northeast corner of said claim, which is situated 550 ft. in a southwesterly direction from Corner No. 4, P. lode patent, survey No. 8870," by tying the claim by course and distance to a patented claim, is sufficient compliance with the statute requiring the description to refer to some natural object or permanent monument. Under the law authorizing the jury to view the mine, it is proper to appoint a party to the action as one of the guides.—Carlin v. Freeman. (75 *Pacific Reporter*, 26); Court of Appeals of Colorado.

PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ending August 23, 1904.

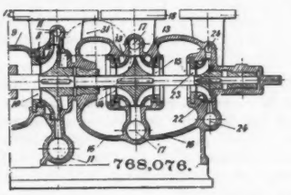
768,024. DUMPING-CAR.—Alfred F. Bernard, Chicago, Ill. A dump-car, comprising a truck and body, a flexible connection attached at one end to the body and adapted to contact with the axle, a shaft having an arm to which the flexible connection is attached, and devices for turning the shaft for effecting an operative engagement between the flexible connection and axle.

768,035. EXTRACTING ZINC OR OTHER SULFIDS FROM THEIR ORES.—Guillaume D. Delprat, Broken Hill, New South Wales, Australia. A method of separating ores from their gangue, which consists in forming an aqueous solution of an acid capable of reacting with the ore to form a gas and increasing the density of said solution by adding thereto a suitable substance, then feeding the mixture of ore and gangue to the solution, decreasing the density of the gas as it is formed on the ore particles, and removing the ore particles raised to the surface.

768,054. ELECTRIC FURNACE.—Carl G. P. de Laval, Stockholm, Sweden. An electric-furnace chamber having a horizontal feed-opening, an escape-opening and a focus of electric heat within said chamber and opposite said feed-opening; the said escape-opening being located above said feed-opening and between said feed-opening and said focus.

768,067. COKE-EXTRACTOR.—William H. McConnell, Covington, Va., assignor to Covington Machine Company. In a coke-extractor, the combination of a ram-carriage arranged to rotate on suitable rollers on the bed-plate of the machine; a suitable bearing attached to the bed-plate around which the carriage rotates, a driving-shaft passing through and rotating in said bearing, a ram sliding in the carriage actuated by the rotation of the shaft; suitable vertical guiding-rollers in the carriage for guiding the horizontal movement of the ram in the carriage; horizontal rollers at either end of the carriage for guiding the vertical movement of the ram; and devices substantially as described whereby the ram-carriage and ram are rotated on the bed-plate.

768,076. PUMPING APPARATUS.—Auguste C. E. Rateau, Paris, France. A steam-turbine and its shaft, a main centrifugal pump of high pressure located upon the turbine-shaft and driven thereby, a centrifugal feed-pump of low pressure also located upon the turbine-shaft and driven thereby to constitute a means



768,076.

for forcing water into the chamber of the main pump, an ejecto-condenser arranged to receive the exhaust from the turbine, an auxiliary centrifugal pump arranged on the turbine-shaft and adapted to force water from the chamber of the feed-pump into and through the ejecto-condenser, and a discharge from said ejecto-condenser leading directly to the chamber of the feed-pump.

768,101. PROCESS OF TREATING AND DISSOLVING WURTZILITE.—Frank M. Whitall, Washington, D. C., assignor of fifty-five one-hundredths to Samuel R. Whitall and Joseph R. Edson, Washington, D. C. The process of dissolving wurtzilite by subjecting it to the solvent action of dead-oil.

768,108. SULPHURIC-ACID PLANT.—Adolf Zanner, Brussels, Belgium. A plant for the manufacture of sulphuric acid, comprising a roasting-furnace, a Glover tower, a heating-flue for the passage of the sulphur fumes and gases from the furnace to the tower, and vessels for the concentration of sulphuric acid located within said flue and adapted to be inserted and withdrawn therefrom, said vessels being provided with an inlet or supply pipe extending through the wall of the flue so as to receive its supply from without, and a discharge-pipe likewise extending through the wall of the flue, and vapor-exit openings discharging into the flue, the inlet or supply pipe being located at the end proximate to the tower and the discharge-pipe being located at the end proximate to the furnace.

768,118. DIGGING OR DREDGING BUCKET.—William S. Ferguson, Wilkinsburg, Pa. In a digging-bucket, the combination with a suspending-frame, of a pair of scoops hinged at their outer ends to said frame, a power-drum mounted in said frame, a pair of closing-cables wound on said drum and one connected directly to each of said scoops, and toggle-links connected to said scoops and having their knuckles guided in vertical ways on said frame.

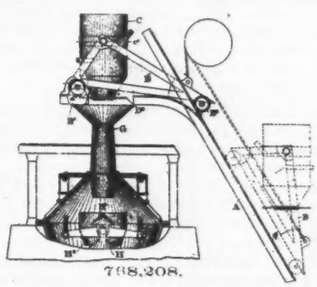
768,175. CONNECTOR FOR ELECTROCHEMICAL APPARATUS.—Oliver P. Fritchle, Denver, Colo. An electric connector, comprising a mercury-cup, a coupler having an end which enters said cup, and a carrier of flexible, non-conductive material supporting said coupler with its end within but out of contact with said cup.

768,191. SAFETY DEVICE FOR CAR-HAULS.—William J. Patterson and Alfred M. Acklin, Pittsburg, Pa., assignors to Heyl & Patterson, Pittsburg, Pa. In a safety device for car-hauls, the combination with a power-driven endless chain, of a sprocket-wheel intermediate the ends of said haul engaged by said chains and means for preventing the rotation of said sprocket-wheel in the opposite direction from the travel of said chain.

768,201 and 768,202. LEADING-SPINDLE AND COUPLING FOR ROLLING-MILLS.—Maximilian M. Suppes, Elyria, Ohio. In a rolling-mill, driving mechanism, the combination of a driving-shaft or gudgeon, a driven shaft or gudgeon, a coupling rigidly secured to the driving-shaft or gudgeon, a leading-spindle having an exteriorly-fluted portion entering the said coupling and engaging interior flutes thereof, said coupling also having a clearance-space to permit abnormal endwise movement of the spindle.

768,207. BLAST-FURNACE TOP AND CHARGING DEVICE.—Samuel W. Vaughen and James B. McClure, Lorain, and Arthur J. Boynton, Elyria, Ohio. In a blast-furnace top, a receiving-hopper having a centrally and horizontally opening discharge valve or diaphragm formed in three or more sections.

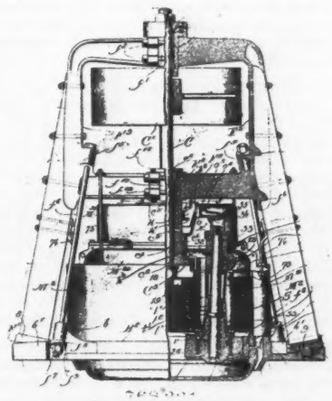
768,208. SKIP-CAR OR HOIST FOR BLAST-FURNACES.—Samuel W. Vaughen and James B. McClure, Lorain, and Arthur J. Boynton, Elyria, Ohio. A



768,208.

skip-car, consisting of a wheeled supporting frame or truck, and a bucket hung on trunnions on said frame or truck and having a centrally-opening discharge-valve at its bottom.

768,221. CRUSHING OR PULVERIZING MILL.—Edwin C. Griffin, Newton, Mass. In a crushing-mill, a metallic bed, a composite frame thereon comprising upright timber standards supported at their lower ends on the bed, a metallic cross-head interposed between the upper ends of the standards and provided

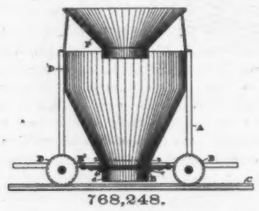


with cheek-pieces to receive the latter, an intermediate cross-girth forming an integral part of the cross-head, bolts rigidly connecting the standards and cross-head, and lateral tension-braces diverging from opposite sides of the standards and attached at their lower ends to the bed, the upper ends of said braces being attached to the cross-head.

768,230. MANUFACTURE OF CARBONIC-ACID GAS.—William J. Knox, Pittsburg, Pa., assignor to Geo. Westinghouse, Pittsburg, Pa. A process of manufacturing carbonic-acid gas, which consists in heating carbonic-acid gas, passing the heated gas through carbonates or carbonic-acid gas-containing substances thereby imparting heat thereto and thus generating additional carbonic-acid gas, withdrawing a portion of the carbonic-acid gas approximately equivalent to that thus generated, reheating the remainder thereof, passing the reheated remainder continuously through

the carbonates or carbonic-acid-gas-containing substances, and increasing the rate of dissociation by the addition of steam to the circulating gaseous heat-carrier.

768,248. STOCK-COLLECTING CAR OR LORRY.—Samuel W. Vaughen and James B. McClure, Lorain, and Arthur J. Boynton, Elyria, Ohio. A stock-collecting car or lorry having its bucket provided with a centrally-discharging receiving-hopper.



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768,264. PROCESS OF PRODUCING COMPOSITE METAL PLATES.—Ferdinand E. Canda, New York, N. Y., assignor to Chrome Steel Works, Chrome, N. J. A method of producing composite steel articles comprising alternate layers of steel of different melting-points, which consists in forming grooves in a surface of an article composed of steel of relatively low melting-point, and then casting molten metal of a grade having a higher melting-point around such article and causing the molten metal to envelop the same to such an extent as to prevent extrusion of the steel of low melting-point upon working.

768,265. METHOD OF PRODUCING OPEN-HEARTH STEEL.—Hugo Carlsson, Sydney, Canada, assignor of one-half to James H. Le Fevre, Sydney, Canada. An improvement in the basic open-hearth process which consists in controlling the character of slag produced by adding to the other materials employed in said process, a quantity of titaniferous ore suitable for said purpose.

768,287. BRICK-KILN.—Carl F. Kaul, Madison, Neb. In a kiln the combination with a main flue, of a plurality of combustion-chambers deposited within said kiln, a coking-pier within each combustion-chamber, a furnace upon opposite sides of each coking-pier, each of said combustion-chambers communicating with its connected kiln, a flue extending from said main flue into each furnace above each grate, a flue within each coking-chamber emptying below the grate of each furnace, said coking-pier flue also communicating with said main flue, a plurality of floor-flues within each kiln, an exit-flue extending from each kiln and entering a main chimney-flue, a valve within said exit-flue communicating with the interior of said kiln, an intake-flue extending from an adjacent kiln entering said main flue, and a valve-controlled exit-flue communicating with the floor-flues of each kiln and entering an adjacent flue.

768,296. CONVEYER.—Staunton B. Peck, Chicago, Ill., assignor to the Link Belt Machinery Company, Chicago, Ill. In a conveyer, the combination of a bucket-carrier with a series of buckets thereon, each bucket provided with an opening located at a considerable distance beyond the line of its attachment to the carrier and at one side of the line of such attachment, and shaped so as to retain its load while traveling in certain directions, a deep trough in which the buckets travel when inverted and through which they push or pull their loads, the bottom of said trough carried around on a curve at the head-wheel on the ascending side, the buckets arranged so that they lie approximately one-half on each side of the axis of the carrier.

768,314. CRYSTALLIZING APPARATUS.—Erich von Seemen and Ernst Rühle, Rheinfelden and Oskar Faller, Basel, Switzerland. In a crystallizing apparatus, the combination with a vessel adapted to receive the liquid to be treated; partition-walls arranged in said vessel and dividing the latter into at least two compartments communicating with each other at the lower as well as at the upper edges of said walls; heating-pockets arranged in one of said compartments and forming passages between the latter and themselves; circulating-pipes extending through said pockets, and means for conducting a heating medium through the latter and around said pipes.

768,319. EXTRACTION OF METAL FROM ORES.—Charles H. Webb Dorking, England, assignor to The Rapid Cyanide Treatment, Ltd., London, England. A process for the treatment of solid material by liquid and the final separation of the solid and liquid particles, consisting of the mixing of the liquid and solid material in a closed revolving filter, assisting and maintaining the continued deposit and support, by a constant vacuum on the delivery side of the filter, of the solid residue upon the filtering-support so as to withdraw the moisture therefrom, discontinuing the vacuum to allow the fall by gravity of the dry residue from the filtering-support and removing the residue from the vat practically dry through suitable apertures.

768,345. PRESS FOR MOLDING ARTIFICIAL-STONE BLOCKS.—Georg H. Rademacher and Johann C. F. Boll, Quickborn, Germany; said Boll assignor to Lorens Christian Filskov, Mögeltonden, Germany. A press for molding artificial-stone blocks, comprising, in combination, a box, a cover formed in sections separated by longitudinal interstices, and hinged partition-plates turnable independently of said cover and adapted to pass through said interstices.

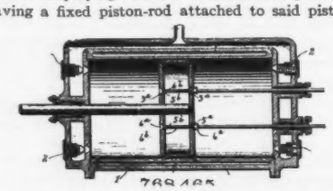
768,362. EXCAVATING-MACHINE.—James P. Gordon, Florence, Colo. The combination of a frame, a scoop or shovel carried by the same, and a combined hoisting and draft rope or cable connected with the shovel and adapted to operate the same and advance the frame.

768,369. GAS-WASHING MECHANISM.—Andrew M. Hunt and Walter S. Dole, San Francisco, Cal. In a gas plant, the combination with a generator, of scrubbers, a plurality of washing-receptacles arranged intermediate the same and slightly above the lower ends thereof, conduits extending inwardly and upwardly from the lower portion of the generator and communicating at their upper ends with the upper portion of the respective washing-receptacles, an outlet in the bottom of said inwardly-extended portion of the conduit adjacent the upwardly-extended portion, means whereby the passage through any of said conduits may be closed at will, and communication between the washing-receptacles and the scrubbers.

768,404. PROCESS OF UTILIZING WASTE GASES.—Alfred Schütt, Charlottenburg, Germany. A process of utilizing hot waste gases which consists in bringing them into contact with water so that said water will absorb the impurities of the gases and will also be partly converted into steam, and then heating a liquid of low boiling-point with the mixture of purified gases and of steam thus obtained.

768,445. MANUFACTURE OF PEAT BLOCKS.—Franz W. Gaertner, St. Petersburg, Russia. A process of manufacturing peat blocks, consisting in intimately mixing peat with powdered colophony and powdered sulphur all in the dry and cold state, the product thus obtained being subjected directly to pressure in the press.

768,465. AIR-COMPRESSOR PISTON VALVE.—George J. Kennedy, Baltimore, Md. In an air-compressor employing hollow or chambered piston and having a fixed piston-rod attached to said piston, a



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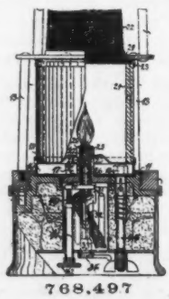
hollow air inlet or tube provided with oppositely-facing valves seating exteriorly in the heads of said pistons and adapted to be actuated by said air-inlet tube and said tube adapted to deliver air to the interior of said piston and into the piston cylinder, the seats of said valves establishing communication between the interior of said piston and the interior of said cylinder.

768,497. MINER'S SAFETY-LAMP.—August Wiedenfeld, Bochum, Germany. In a lamp having a burner provided with a wick-tube, burner and tube being each provided with a slot, the two slots being adjustable so as to form a conduit reaching to the top of the



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burner, an igniter, a compartment composed of the cover of the lamp vessel and a cap or hood covering said compartment and separating it from the outside, said compartment containing said igniter and match in said compartment.

768,482. FINE-FUEL-FEEDING APPARATUS.—Matihs Prigga, St. Petersburg, Russia. A spray-producer for massut, coal-dust and the like, consisting of a steam-pipe having a flattened front part and terminating at the outer edge in a slit, a rim surrounding the upper surface of the said front part, a massut-admission pipe extending substantially at right angles to and terminating above this surface and having a dented edge bearing upon the same.

768,512. EXPLOSIVE COMPOUND.—Norbert Ceipek Vienna Austria-Hungary. An explosive compound consisting of 80 parts by weight of ammonium nitrate, 10 parts by weight of anilin nitrate, 5 parts by weight of potassic nitrate and 5 parts by weight of picric acid.

768,535. DUMP-CAR.—Otto W. Meissner, Chicago, Ill., assignor to Rodger Ballast Car Company, Cook county, Ill. In a dump-car, the combination of a supporting-framework having upwardly-extending side and end boards, and a dumping bottom portion formed of a central V-shaped portion extending lengthwise of the car and underneath the supporting-frame and two swinging sections pivotally secured to the framework of the car to each side of the V-shaped dumping portion and arranged to lie in a flat plane and form flat floor portions and to be swung downwardly to discharge a portion of the load.

768,546. TUYERE-IRON.—Loudon Silcott, Mount Vernon, Ohio. A tuyere-iron comprising a cylinder having a blast-opening, and a valve pivoted within the cylinder and comprising wings one at an angle to the other and both engaging the inner circumference of the cylinder in opening and closing the latter and the said blast-opening

768,551. MANUFACTURE OF IRON AND STEEL AND THEIR ALLOYS.—Jose B. de Alzugaray, Bromley, England. In the process of manufacturing iron and steel and their alloys, producing refined pig-iron by mixing pulverized ore with pulverized carbon in excess of that required for reduction and an alkaline substance and water, adding thereto a mixture of a fluoride and a chloride, forming fluxing and refining agents, compressing the mixture into bricks and subjecting the bricks to the action of heat in any well-known manner as described.

768,552. MANUFACTURE OF IRON AND STEEL AND THEIR ALLOYS.—José B. de Alzugaray, Bromley, England. The process of manufacturing iron and steel and their alloys and consisting in mixing pulverized ore with a binding material, a mixture of a fluoride and a chloride adapted to act as both fluxing and refining agents to produce a non-carburized material, compressing the same into bricks, and fusing these bricks together with pig-iron and scrap.

768,553. MANUFACTURE OF IRON AND STEEL AND THEIR ALLOYS.—José B. de Alzugaray, Bromley, England. The process of manufacturing iron and steel and their alloys from the ore and consisting in mixing pulverized ore with carbon in excess of that required for reduction and a flux and refining agent to produce a carburized material, compressing the same into bricks and fusing these bricks with similar bricks of a non-carburized material composed of ore, a binding material, a flux and a refining agent.

768,562. PROCESS OF FORMING ORGANIC PEROXIDE ACIDS.—Alphonso M. Clover, Ann Arbor, Mich. A process of forming organic peroxide acids which consists in treating an anhydride of a dibasic acid with a solution of hydrogen peroxide.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Offices on subjects connected with mining and metallurgy.

Week Ending August 6, 1904.

19,030 of 1903. COLLIERY WAGON.—A von Bergen, Darlington. Improved form of tipping wagon for mines and collieries.

19,267 of 1903. MAKING BI-PHOSPHATE OF LIME.—E. Bergmann, Ohlan, Silesia, Germany. Improved method of producing a bi-phosphate of lime free from sulphite of lime.

218 of 1904. SLAG CEMENT.—C. von Forell, Hamburg, Germany. Making a cement from slag by powdering the slag, then heating it in an oxidizing flame to just below the point of fusion, and then quenching.

8,859 of 1904. ABRASIVE.—J. Windholz, Paris, France. An abrasive compound consisting of a mixture of carbide of boron and alumina.

12,626 of 1904. ROCK DRILL CHUCK.—W. C. Stephens, Camborne. Improved chucks for holding the tool in rock drills.

12,797 of 1904. ROASTING CALAMINE.—E. Leduc and C. Griffiths, Gragny, France. Separating carbonate of lime from calamine by roasting and dissolving out the lime by a sugar solution, the sugar being regenerated by the action of the gaseous carbonic acid given off in the calciners.

SPECIAL CORRESPONDENCE

San Francisco. Aug. 24.

(From Our Special Correspondent.)

The River Commission has seen the deposits of debris around Marysville, and looked at the lower rivers, where the engineering work will be the greatest. At the delta of the main streams they were shown how last winter's floods entailed damage amounting to nearly $4,000,000. The possibilities of adequate protection were shown in the solid levees of Grand Island and the Pearson district. The big dam sites at Daguerre Point were examined. The Commission was much impressed by the deposits just above Marysville, 15 miles long, over a mile wide and from 20 to 60 ft. deep. It is this material the Government engineers are trying to keep back, by the dams under construction. There are supposed to be over 600,000,000 cu. yd. of detrius, mainly from mining, but a certain proportion from agricultural operations. Major T. J. Dabney, of the Commission, is reported to have said: "As long as the tailings from the mines continue to come down and fill the river channels, there can be no definite settlement of the river problem." If that is his opinion, the Commission might as well quit work at once. Hydraulic mining has practically ceased in that region, except as permitted by the California Debris Commission, when the tailings are held back in settling basins. But the debris deposited in the tributaries many years ago comes down with the winter floods, and will continue to come down for years. Some of this, deposited 200 miles above will not reach the lower rivers for 25 to 50 years. The men who mined in the 50's left debris in the gulches and canyons which is gradually reaching the lower rivers. The engineers building the dams know that no new debris is accumulating in the rivers, but that they must keep back what is there and is coming down. This new Commission was to devise some way to stop farther encroachments of debris on the navigable streams, and prevent possible overflows each winter. At Daguerre Point the resident Government engineers are making a cut 36 ft. deep, half a mile long and 600 ft. wide at bottom. The Board of Engineers is through with its inspection and has resumed public hearings in this city.

In the suit of the Rawhide Mining Co. against the Tuolumne County Water & Electric Power Co., for damages and possession of plants, on the ground of breach of contract, a compromise has been effected and the suit dismissed. The judge ordered that, of the $30,000 held by the United States marshal, $15,000 should go to the Rawhide, the rest to the Tuolumne County Co. The suit, commenced by Capt. Nevills, of the Rawhide and App mines, was for $150,000.

Letson Balliet, of the White Swan mines, is in more trouble, the new board of directors having demanded an accounting. It is alleged that he sold about $300,000 worth of stock, that not a third of this sum has gone into the development of the mines, and that there are $10,000 or $15,000 worth of debts to be paid. The board has demanded from Balliet all the moneys he received while acting as the company's treasurer and manager, from March, 1900, to March, 1904, and threaten that if the demand is not complied with other proceedings will follow. It is stated by stockholders that, even after the mine was closed down last fall, Balliet received considerable sums from stockholders, and none of this money was used to pay off the debts. Some thousands of persons in the eastern part of the United States are more or less interested in this company.

The 32 claims of chromic iron near Sims, Shasta county, have been purchased by the Chrome Iron Co., of Germany, represented here by Geo. Bayha. These mines have been the only ones worked in the State in recent years. There is plenty of chrome in California, but only deposits close to railroad lines are of much value, owing to the cost of transportation.

The El Dorado Copper Co., near Georgetown, El Dorado county, is now shipping asbestos to the paper mill at Antioch. Little or no asbestos has been produced in California in recent years, as much of it is of inferior quality and the manufacturers prefer to buy from Canada.

Denver. Aug. 27.

(From Our Special Correspondent.)

A number of incidents in the Cripple Creek district show that peace has by no means been re-established in that troubled region, and the courts of the State will have trouble in adjusting matters as time progresses and new complications arise. On August 20, after it became known that some men had been seen running away from the shafthouse of Henry Adney mine, on Beacon Hill, an investigation had shown that the hoisting machinery had been tampered with, there was much excitement caused, and about 1,000 determined nonunion men gathered with the purpose of deporting another lot of agitators or sympathizers with the Western Federation of Miners. The union store, which had been purchased by the Interstate Mercantile Co., was partly wrecked, and 15 men were escorted about 4 miles from town, and told that if they came back they would get a rope or a bullet. Four of the prisoners were deported in the direction of Canon City, about 40 miles away, by a smaller party. The sheriff's deputies were overpowered, and were entirely unable to control the situation.

A number of men who expected to be deported have left the district, and for the present matters are quiet again, but these occurrences certainly show a lawless spirit, and no one will be surprised if troops, either State or Federal, are needed before matters become normal. The community is certainly making a desperate fight to break up entirely, not only the power, but any influence of the Western Federation in the management of its affairs, and any attempted outrage by any adherent of the Federation may be followed by an outbreak. The feeling is extremely bitter, and is unfortunately getting more so all the time. Naturally, it will take months, maybe years, to settle finally the legal questions involved, and it is to be hoped that delays in the trials of the innumerable lawsuits will be avoided as far as possible and final decisions rendered that will end this strife and establish civil authority on a firm basis.

Four men working in the Black Bear mine, in Ingram basin, near Telluride, said to have been labor agitators, were deported from there a few days ago, and went to Silverton.

During the past week the guns confiscated during the existence of martial law in Las Animas county were returned to their owners.

News of the completion of the reorganization plans of the Colorado Fuel & Iron Co. was received here with much satisfaction. Four tunnels have been started already in the Lewis iron deposits. The beds will be explored to considerable depth, and a branch line from Sargent to White Pine will probably be constructed.

Construction work on the Denver, Northwestern & Pacific Railroad is progressing rapidly, and the tracks are laid to within 3 miles of the summit of the continental divide. Daily excursions to Mammoth are well patronized.

The plan to lease the Smuggler-Union mine at Telluride to Samuel D. Nicholson, of Leadville, said to be acting for the Guggenheim Exploration Co., was not carried through, and from present indications there will be a number of lessees.

The State School of Mines at Golden is about to enter upon its most prosperous year. The number of freshmen will be about 125, while the total number of students will be over 300. The school year begins September 5; nearly 20 States will be represented among the students, besides several foreign countries, including Mexico and Japan. It is hoped that the next Legislature will be more liberal in appropriating of funds for the school.

Salt Lake City Aug. 26.

(From Our Special Correspondent.)

It is stated that several important deals are pending at Ophir, in Tooele county, which, when consummated, will bring a great revival in mining. The Ophir Hill Mining Co., headed by W. A. Clark, of Montana, is said to be the chief factor in pending negotiations to bond mines and prospects along the line of the long tunnel projected by the Ophir company. Several options have been secured, and papers are being prepared on others.

The lessees of the old Chloride Point mine, on Lion hill, just across the canyon from the Ophir Hill mine, are taking out some very fine ore, and marketing from one to two carloads a month. The Chloride Point company failed to make a profit, but the lessees, Ophir men, know the ground thoroughly and are making good money. It is stated that a deal is pending for the sale of this property, and that it is more than likely to pass into the hands of a strong syndicate.

Considerable interest is shown locally in the rumor of a deal involving the consolidation of the interests of the Ohio Copper Co., at Bingham, with those of the Fortuna Co., as the consolidation would cover some of the best mining ground in that camp. The mines of the Ohio company are well developed, it is claimed $2,000,000 worth of ore is exposed, and the property is equipped with fine reduction works. The Fortuna, adjoining the Ohio on the east, is believed to carry the extension of the vein, and has been a regular producer for years.

The Bingham Copper Boy Mining Co., of Salt Lake, owning considerable copper ground in Pine canyon, just over the divide from and adjoining the holdings of the Highland Boy, holds its annual meeting in this city on September 26. Many eastern shareholders and officials will be present. After the meeting the party will visit the mine.

Toronto. Aug. 26.

(From Our Special Correspondent.)

Thomas W. Gibson, director of the Ontario Bureau of Mines, has returned from a trip through the mining districts of New Ontario. He visited Dr. Coleman's party, studying the nickel range between White Water lake boundaries and Vermilion lake. Mr. Gibson states that the nickel industry is flourishing. The Canadian Copper Co. has about completed its new plant at Copper Cliff, and is taking most of its ore from the Creighton mine, five or six miles from Copper Cliff, where an open cut about 250 by 300 ft. and 60 ft. deep is practically all in ore. Below this 80 ft. is a second level, which has been broken through to the floor of the first, the intention being to slope out all the area between. It is also proposed to open a smaller pit about 500 ft. distant on the ore body. Between 250 and 300 roast heaps are burning in the Copper Cliff roast yards. The North Star mine is operated by the Mond Nickel Co., the ore being conveyed for treatment to the Victoria mine. The Bessemerizing portion of the Mond company's plant is used to heat the Canadian Copper Co.'s matte. Mr. Gibson also visited the Massey Station copper mine, where a large quantity of moderate grade ore has been obtained, and the Hermina copper mine, where a shaft has been sunk 140 ft., reaching a rich though rather narrow vein. At the Shakespeare gold mine, near Webbwood, work is being pushed; the ore pans gold readily.

Mining and other industrial operations will be greatly facilitated by the extensive development of water power for electric energy, now being undertaken in several localities. The Canadian Copper Co. will develop power for its works and mines at High Falls on the Spanish river. The Spanish River Pulp & Paper Co. is putting in a dam at Webbwood Falls. The Sudbury Power Co. will produce electric energy to the extent of 3,000 h. p. at McPherson's Falls on the Vermilion river. On the Walmagritæ river, in Dryden township, Cochrane & McVittie will have a power plant.

The Dominion Iron and Steel Co. has awarded the contract for a new rail mill at its works at Sydney, N. S., to the Wellman-Seaver-Morgan Co., of Cleveland O. S. P. Wellman has gone to Sydney, accompanied by J. H. Plummer, president, and Graham Fraser, general manager, of the Dominion Co. The entire plant is promised within 3 months and the management expects to be able to manufacture rails next July.

The collieries of the Dominion Coal Co., at Glace Bay, N. S., were inspected by E. S. Clonston, general manager of the Bank of Montreal, and H. V. Meredith, assistant general manager. The significance of this visit lies in the fact that the bank holds loans of the Dominion Coal Co. amounting to $3,000,000. The company recently endeavored without success to effect a further loan.

A 30-days' mill, run at the Sunbeam gold mine, otherwise known as A. L. 282, on the Canadian Northern Pacific railroad, near Port Arthur, has produced a gold brick valued at $8,000. The shaft is down 300 ft. The company has 25 men at work on a new engine house.

The Provincial Bureau of Mines has received information of important iron ore discoveries in McTavish township, at Loon lake, east of Port Arthur, on land owned by Wiley & Co. There appear to be two well-defined ore zones in the Animikie formation. One bed is about 20 ft. and the other from 20 to 40 ft. thick. The ore is hematite, ranging from 50 to 65% in iron, low in phosphorus and high in lime, the better ore being of Bessemer grade. A large proportion is more silicious but of softer texture and good quality. The Ontario government diamond drill, which had been working at Blank Bay, Lake Superior, is being transferred to these deposits. This field is only 4 or 5 miles from Lake Superior.

As a result of dullness in the mica trade, the General Electric Co., of Schenectady, N. Y., has closed its mica works at Perth and Smith's Falls, Ont., and the staff of their Ottawa branch has been reduced.

Regulations governing the payment of bounties on crude petroleum produced from Canadian wells have been framed by the Canadian Government. All producers claiming the bounty of 1.5c. per gal. must notify the Minister of Trade and Commerce and furnish a declaration as to location of wells, monthly production, names and addresses of purchasers of the product and all particulars as to ownership. Their books are to be open to inspection, and claims are to be substantiated by certificates of the receiving stations and of the purchasers. Samuel Brown, of Mount Forest, has been appointed inspector to supervise the payment of bounties.

A company at Bannockburn, Ont., proposes to take advantage of the lead bounty act. A smelter has been erected, and a considerable quantity of lead is at the station awaiting the inspector's report. The British Columbia lead has hitherto held the Eastern market against the lead deposits of Ontario and Quebec, as the ore carried gold and silver. The bounty, however, is expected to enable the owners of Eastern deposits to enter the field.

The first steel rails manufactured at the steel plant of the Lake Superior Corporation of Sault Ste. Marie since the reorganization were turned out on August 25. As fast as the material arrives the blast furnaces will be put in operation. Large amounts of ore are coming in by water and by rail. Contracts for rails to be used in re-laying the Intercolonial Railway tracks have been made with the Dominion Government; between 30,000 and 50,000 tons will be required. This, with other orders, assures work for some time.

Victoria. Aug. 23.

(From Our Special Correspondent.)

Boundary District.—A 14-in. vein of good grade ore has been found in the Barbara, a claim just east of Greenwood, which shows lead, zinc and copper minerals in a quartz gangue. The main shaft of the Brooklyn mine, at Phoenix, one of the properties lately acquired by the Montreal & Boston Consolidated Co., is being enlarged, and ore bins for this mine and the adjoining Stemwinder are being erected beside the spur from the Canadian Pacific Railway. Grading is in progress for three tracks to ship ore from the Granby company's No. 4 tunnel over the Great Northern Railway Co.'s branch line. Preparations are being made at the British Columbia Copper Co.'s Mother Lode mine, near Greenwood, to install a second Farrel-Bacon crusher. Ore shipments from Boundary mines for the current year now aggregate about 525,000 tons. The total tonnage for the whole of last year was 685,272 tons; this year's aggregate will be probably considerably larger.

Rossland.—The erection of the 100-ton Elmore oil cencentration plant at the White Bear mine is nearly completed. It is anticipated that the running expenses of this plant will not be much greater than at the 50-ton plant at the adjoining Le Roi No. 2 mine. At the Velvet mine, the concentrator has been completed, and preliminary operations are stated to show excellent results. A series of concentration tests of Le Roi ores have been satisfactorily concluded, and the return from England of the managing director, Mr. A. J. McMillan, is awaited, to learn the directors' decision as to erecting a concentrator for the lower grade ores.

Slocan.—The company owning the Slocan Star group lately paid dividend No. 10, $25,000; the capitalization is $500,000, and the total amount paid in dividends is said to be now $575,000. The ore is generally high-grade, and it has been opened to a vertical depth of 800 ft. At the annual meeting of the Associated Silver-Lead Mines of British Columbia, at Sandon, last week, the retiring president, Mr. A. C. Garde, resident manager of the Payne Consolidated Mining Co., was re-elected; the other officers and executive committee for the ensuing year are: Vice-presidents, Jas. Cronin, W. S. Drewry, W. S. Jenkins, Wm. Hunter and Geo. Alexander; secretary, N. J. Cavanaugh; treasurer, Oscar V. White; executive, J. L. Retallach, G. D. Potter, Norman Carmichael, L. Pratt, W. E. Zwickey, H. Giegerich and N. J. Cavanaugh. The president's report showed that the association had accomplished much for the silver-lead mining industry of the Province, which is in a more flourishing condition than for years past.

Atlin.—When the Supreme Court of British Columbia held a session at Atlin City, recently, the grand jury, in a presentation, directed attention to the large area of mining ground in the district held under lease, though no work is done on it. It recommended that facilities be given the public for ascertaining whether or not work required by the conditions of the leases is performed, and that unworked leases be cancelled and the ground, where suitable, be thrown open for location by individual miners in 259-ft. placer claims only. Mr. R. D. Fetherstonhaugh has returned to Atlin from a trip to examine the coal lands of the Atlin-Tooya Coal Prospecting Syndicate, on Tooya river, near Telegraph creek. He reports a large surface showing of coal. A. E. Larson, who is working a lay on the American Mining Co.'s property, on McKee creek, is reported to have found a gold nugget weighing 44 oz. 11 dwt.

Yukon.—The annual report of the territorial engineer shows that from 1899 to June 30, 1904, the Dominion Government has built, in the Yukon Territory, 252 miles of wagon road and 626 miles of sled road, at an expenditure, including maintenance, of $1,030,118. The engineer also reports having inspected two routes for a wagon road from Whitehorse to the new Alsek diggings. By one route the distance to Bullion Creek would be 158 miles, and estimated cost of road about $40,000; by the other route, 143 miles, cost $45,000. No. 2 route, besides being 15 miles shorter, would pass through the copper belt. The territorial boiler inspector reports that there are 613 steam boilers in use in the Klondike. Litigation, which the Yukon *World* says will have the effect of tying up a large part of one of the richest creeks in the Klondike, and will decrease this season's gold output more than $500,000, has begun in the territorial court, Dawson. The Gold Run (Klondike) Mining Co. brought action against Belinda Agnes Carbonneau, Charles Eugene Carbonneau, and 25 other defendants, nearly all of whom are residents of London, England, or Paris, France, the case really being the Chute & Wills interests and the Canadian Bank of Commerce, which holds a mortgage on the property, against the Carbonneaus, who were in possession. The property includes 20 creek claims, machinery and a number of hillside claims, the whole having been sold to the company for $1,750,000, of which $750,000 was payable in cash. The plaintiffs ask for an injunction restraining Mrs. Carbonneau, who has been in charge, or any one else, from interfering with the affairs of the company, and demand an accounting of all moneys, besides $10,000 damages and costs. The injunction was granted temporarily, and the sheriff appointed receiver, with instructions to proceed with the wash-up of the dumps, pay costs of clean-up, and deposit the balance of proceeds with the court.

A case of importance to mining companies and labor unions in Canada is that of the Center Star Mining Co., Ltd., against the miners' union at Rossland (a branch of the Western Federation of Miners), the carpenters' union and several individuals. It grew out of the strike ordered by the union three years ago. The company sued for $50,000 damages for loss and injury sustained through the defendants' maliciously conspiring to bring about a sympathetic strike among its employees. The trial has been long delayed, but on August 17 judgment was rendered by Mr. Justice Duff, after a jury had found for the plaintiffs on all material points, confirming the jury's award of $12,500 damages against the miners' union and dismissing the defendants' petition for a non-suit. An appeal to the Supreme Court of Canada will probably be taken, but the judgment may have a subduing effect in Montana and Colorado, as well as in Canada.

Monterey. Aug. 24.

(From Our Special Correspondent.)

It is understood that the concession obtained from the Government last year by a number of Zacatecas capitalists to erect a smelter in Zacatecas, has been forfeited for non-fulfillment of the requirements of the concession, due to inability to raise funds. It seemed a doubtful venture at the best. The American Smelting and Refining Co. is said to have recently taken an option on the Gran Cuadra Pridigio Y Anexas, of Walter C. Palmer and associates, and expended some $50,000, Mexican, in machinery and sunk the principal shaft, the Rondanera, 40 meters, obtaining a total depth of 300 meters, from which the company is doing its development work. W. C. Palmer has been instrumental in having a 25-ton concentrating mill erected by the Zaragoza Manufacturing Co., of Zacatecas. B. Clark Wheeler, once of Aspen, Colo., is getting his cyanide plant in position at La Noria, near Sombrerete. At Mezquital del Oro the Mezquital Mines Co., Ltd., of which J. F. McNabb, of London, is secretary, has about completed the 50-stamp mill and 80-ton cyanide plant on the property purchased last year for $400,000, Mexican, which will now be worked on a larger scale, under the management of Maurice Cockerell, for several years in charge of the United Mexican Mines, Ltd., at Guanajuato. The Mazapil Copper Co. is placing in Concepcion del Oro, on the Aranzaza mine, five 50-h. p. Crossley gasoline engines. Negotiations are on for the sale of the Cinco Estrellas mine at Pinos, where the Canadian mine has been forced to close temporarily because of a large cave-in.

From Jalisco comes the report that Geo. E. MacCormick and T. L. Woodruff, owners of the Soledad mine, on Titita mountain comprising 45 pertinencias with a good vein of gold and silver-bearing copper ore have struck ore, running some $300, Mexican, to the ton. Mr. F. W. Page has been made manager of the United Mexican Mining & Milling Co., at Mascota.

In Guerrero, the Rosario Manufacturing Co., of San Nicolas del Oro, has leased the old mill of San Carolina. Good coal is reported at Buena Vista, near Cuernavaca, and about 4 miles from the Cuernavaca & Pacific branch of the Mexican Central Railroad; it is believed the Iguala mine people are negotiating for the purchase of the property. The Balsas Valley Mining Co. is considering closing its Mina Grande, at San Nicolas del Oro, for which the company paid $100,000, gold, two years ago, and where it since spent, under the superintendence of W. W. Miller, $350,000, Mexican, in development work and improvements. The eight-days' haul to the railroad was more than the ore could stand. If work is continued a 60 or 100-stamp mill will be erected.

In El Oro district, of the State of Mexico, the Esperanza Co., the Dos Estrellas Co., and the El Oro Mining & Railway Co. are preparing to change from steam to electricity as soon as the Mexico Light & Power Co. gets its wires in from Necaxa. Los Ocotes Co. has voted to reorganize under the name of Los Ocotes Mining & Milling Co., of Arizona, with a capital of $500,000, gold, shares at $1 par and non-assessable; 84,000 shares will

be given for the old stock and the remainder sold; the new company is to take up assets and liabilities of the old.

London. Aug. 20.

(From Our Special Correspondent.)

Mining men have been considerably amused by the discovery on the part of Stock Exchange people and the non-technical press of a wonderful new process which is to revolutionize the metallurgical treatment of gold ores on the Rand. The rumors circulated were so enthusiastic in their references to revolutionary metallurgy and unheard-of economies, that engineers were inclined to pass them by and attribute them to the imagination of bulls or inexperienced journalists. On closer investigation, however, it was found that the information on which the Stock Exchange rumors and newspaper paragraphs were founded had a basis of fact and was supplied by a well known member of the profession, interested in the process, and just returned from a visit to South Africa; but as usual, the mining market and the press had absurdly exaggerated and made the proverbial swan out of a duck, or mountain out of a mole-hill. The process to which reference was made is perfectly well known to mining engineers and metallurgists, being none other than the fine grinding of the pulp after coming from the stamp mill and before going to the cyanide plant. In Africa and West Australia this alteration in the period at which crushing or grinding is done is a matter of common knowledge to mining men and metallurgists, but it is probably not so well known in America. For this reason, and also for the purpose of giving the real facts connected with this absurd booming of a process on the London stock market, I may be right in giving some details. In the JOURNAL, during the past few years, the practice at Kalgoorlie of sliming everything for wet extraction by means of ball-mills, tube-mills, or other pulverizers, has been often described. The success of the system attracted attention in South Africa and most of the leading engineers there have experimented on the subject. On the Rand, where there are such quantities of low-grade ore, economy in the utilization of plant and completeness of extraction are worth close study even if it is only 5c. a ton that is involved. To get more complete extraction by cyaniding, finer crushing was required, but the crushing in the stamps was already as fine as considerations of economy warranted. The comparative cost of reduction in stamps and various pulverizers was studied. Eventually it was found that the most economical plan was to crush as coarse as possible in the stamps to not more than 15 holes to the linear inch, and afterward to reduce everything to slime of extreme fineness. The question of economy depends on the relative cost of stamps, pulverizers, and filter presses, and without exact figures it is impossible and unnecessary to go into details or do anything further than draw attention to the general principles. Incidentally, I may mention that the partial disenthronement of the stamp mill has given severe pangs to many American mining men in South Africa, for, as an Englishman once said, the stamp mill is the only deity that an American worships.

Perth. July 18.

(From Our Special Correspondent.)

During the first 6 months of this year, the Kalgoorlie district produced gold to the value of £2,500,000, and paid dividends of £752,951. Other Western Australia companies, outside the Kalgoorlie area, paid, during the same period, £262,600.

In the Great Boulder Proprietary, at the 1,750-ft. level, the ore body is now 23 ft. wide, and average assays are 16 dwt. per ton. The mine generally is looking well. The Associated has started its new 20-stamp mill for low-grade ores. The North Kalgurli has about 7,000 tons of slimes awaiting treatment, and a new filter press plant is about to be erected. The Ivanhoe's working costs for June were 22s. 7d. per ton, and the estimated profit £22,-858. This mine has produced to date 20 tons, 4,575 lb., of gold. The Associated Northern shows decided improvement; the June profit was £6,531.

TO ENGINEERS VISITING NEW YORK.

A room for the exclusive use of visiting mining engineers is maintained at the New York office of the ENGINEERING AND MINING JOURNAL.—Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL, and making this office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and be of any service to them that they can.

TO ENGINEERS VISITING LONDON.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers nonresident in Great Britain the privilege of free use of the Institution offices and library in Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution, and thus enjoy the advantages of temporary office accommodations in the city of London.

PERSONAL.

Mining and metallurgical engineers are invited to keep the ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

M. F. H. Minard left Denver for Mexico on August 20.

Mr. John Seward has returned to New York from Idaho.

Mr. John Seward is examining fluorspar mines in Southern Illinois.

Mr. W. L. Austin is at the White Knob mines near Mackay, Idaho.

Mr. William Braden has returned to New York from Santiago, Chili.

Mr. W. S. Thyng has been in the Cedar Canyon district, Washington.

Mr. Robert Hay Anderson, of Mexico City, sails for London on September 3.

Mr. W. H. Argall has returned to London from Australia and New Zealand.

Mr. Shepherd T. McCormick has returned to London from the Dutch East Indies.

Mr. W. H. Winterman has returned to London after an extended trip to Mexico.

Mr. F. L. Bosqui, of San Francisco, has been at the Gold Roads mine, at Acme, Ariz.

Mr. Thos. Pascoe has left Harrietville, Victoria, and is now on his way to England.

Mr. J. W. Pearce, of London, is examining some mining properties in El Oro, Mexico.

Mr. Robert Hay Anderson, of the City of Mexico, is visiting New York this week.

Mr. Louis Noble has returned to Denver from the Monte Cristo Mines, in Washington.

Mr. Ernest A. Weinberg, of London and Sydney, passed through New York on his way westward.

Mr. J. D. Audley Smith has returned from England and intends to make Salt Lake City his headquarters.

Mr. George F. Beardsley is professionally engaged just now at the Tennessee Copper Co.'s smelter at Ducktown.

Mr. Millard Hunsiker, the London representative of the United States Steel Corporation, is in this country.

Mr. Parrington M. McCree has been appointed superintendent of the Utah-Apex Co.'s mines at Bingham, Utah.

Mr. R. H. P. Bullen has been appointed superintendent of the Ooregum gold mine in the Kolar goldfields, Mysore district, India.

Mr. Frank Robbins, of Los Angeles, is at present engaged in examining several of the quicksilver deposits of San Luis Obispo county, Cal.

Mr. Wm. M. Courtis, of Detroit, Mich., has left for New Mexico and California, to examine and report upon some placer mines in those States.

Mr. Henry Sabin has been temporarily appointed general superintendent of Le Roi smelter at Northport, Wash., to succeed Mr. E. J. Wilson.

Mr. Herman Nieter, who has been with the Engineering Company of America, is now Eastern representative of the Hammond Iron Works, of Warren, Pa.

Mr. M. Brock Jacobs has resigned as eastern agent of the United Coal Co., to become president of the Monarch Coal & Coke Co., with office in New York City.

Mr. E. W. Sebben, of Denver, who recently returned from a visit to Gunnison county, Colo., is in New York and expects to return to Denver about September 1.

Mr. Walter L. Johnson, of the iron and steel firm of Bell Bros., of Middlesboro-on-Tees, England, has returned to Europe, after a short visit in this country.

Mr. E. F. Smith, consulting engineer of the Kanawha Fuel Co., has severed his connection with that company and is associated with A. Y. Malcolmson, of Detroit, Michigan.

Mr. Samuel R. Trengrove, for the past two years superintendent of the Bibiana Gold Fields Mining Co. in West Africa, has resigned his position and returned to this country.

Mr. Ernst A. Sjostedt has resumed his position as chief metallurgist of the Lake Superior Corporation and allied companies, with headquarters at Sault Ste. Marie, Ontario.

Mr. R. W. Conklin has been appointed agent for the Granby Mining & Smelting Co., of St. Louis, Mo., for pig lead and spelter, with offices in the Park Row Building, New York City.

Mr. Charles A. Peet is making surveys for a site for deep tunnel workings on the property of the Consolidated Jefferson Gold & Copper Mining Co., southeast of Salt Lake City, Utah.

Mr. G. H. Gardner has resigned as president of the Iron & Steel Press Co. and Mr. John A. Penton has been elected to succeed him. Mr. Gardner has been connected with *The Iron Trade Review* for the past 13 years.

Messrs. Charles E. Finney, Walter R. Ingalls and Hermann A. Kellar have united in consulting engineering practice under the firm name of the 'Mines and Metallurgical Company,' with offices at 52 Broadway, New York.

Mr. R. H. Channing, Jr., is manager of the Utah Consolidated Mining Co. A typographical error in this column last week made him general manager of the Utah Copper Co. Mr. D. C. Jackling is manager of that company.

Mr. William F. Stevens is at Swissvale, Pa. As the name of Mr. Stevens is found among the deceased members of the American Institute of Mining Engineers, it will give the keenest pleasure to many of our readers to know that he is well and prosperous.

Mr. Edmund Juessen fortunately escaped probably fatal injury at Libby, Mont., August 24. While examining the Snowshoe mine he fell into a shaft and was saved from striking the bottom 250 ft. below only by a narrow, projecting ledge. Mr. Juessen had his shoulder dislocated and received painful bruises.

Messrs. Ludwig and Koenig, respectively, director of the works and machine inspector at the Mansfeld copper works at Eisleben, Germany, are now in this country. They will attend the meeting of the American Institute of Mining Engineers in the iron country, and will visit the St. Louis Exposition.

M. C. Chomienne, director of the Arbel forges at Rive-de-Gier, France, passed through New York this week, on his way to St. Louis. M. Chomienne intends to spend some time in the United States; he is charged with the duty of preparing reports to the French Government on metallurgical progress and on technical education in the United States.

Among those present at the Mining Congress which met at Portland, Oregon, on August 22, were the following: F. H. Newell, Gifford Pinchot and S. F. Emmons, of Washington, D. C.; R. C. Patterson, of Omaha; James T. Small, of Maine; George W. Dorsey, of Nebraska; Irwin Mahon, of Carlisle, Penn.; E. R. Buckley, of Rolla, Mo.; J. H. Richards, of Boise, Idaho; James F. Callbreath, James W. Abbott and E. G. Reinert, of Colorado; J. E. Talmage, John Dern, W. J. Halloran, O. W. Powers, A. J. Davis, J. W. Houston, and H. S. Joseph, of Utah; J. T. Cornforth, of Alaska; H. S. Clark, James H. Lynch and Eugene B. Braden, of Montana; James W. Malcolmson, Morris P. Kirk, Gentry Waldo, A. W. Gifford and J. H. Campbell, of Texas; Thomas Ewing, John Daggett, M. P. Gilbert and S. W. Mudd, of California; Maurice D. Leehey, of Seattle; F. C. Loring, of Spokane; John S. Crawford, L. T. Terry, Frank V. Drake, L. F. Watson, W. B. Dennis and H. W. Scott, of Oregon; T. W. McQueen, of Ontario, and T. A. Rickard, of New York.

OBITUARY.

James A. Vining, general superintendent of the Whitman & Barnes Mfg. plant at Akron, O., died August 18, aged 47 years.

William W. Morris, one of the pioneer mining men of Montana, died at Reveille, Nev., August 21, aged 64 years. Mr. Morris went to Montana in 1864.

John Walter Best, general manager and treasurer of the Northern Coal & Coke Co., of Denver, Colo., died at Denver, Aug. 20, aged 29 years. Mr. Best was a graduate of the Colorado School of Mines, and of the Sheffield Scientific School.

Robert Parrott, discoverer of the Parrott mine at Butte, Mont., died August 26, at Des Moines, Ia., in moderate circumstances, at the age of 75. As a young man Parrott went West, and while prospecting discovered the great copper mine which bears his name. He sold the mine in a few years to Marcus Daly, and, it is said, did not profit much by his discovery.

SOCIETIES AND TECHNICAL SCHOOLS.

American Electrochemical Society.—The annual meeting of this society will be held at St. Louis, September 13, 15 and 16. A part of the session will be in conjunction with the International Electrical Congress.

International Electrical Congress.—This meeting will be held at St. Louis the week beginning September 16. Following the session, excursions will be run to Schenectady, Montreal, Pittsburg and other important electrical centers.

Society of Chemical Industry.—An interesting programme has been arranged for the annual meeting in New York from September 7 to 12. Sir William Ramsay, the retiring president, will deliver an address at the general meeting in the gymnasium of Columbia University on September 8 at 10:30 A.M. On Friday, September 9, and Saturday, September 10, visits will be made to various manufacturing establishments, including the copper refinery of the Nichols Chemical Co., at Laurel Hill; New Jersey Zinc Company's Spiegel furnace, at Hackensack Meadow; Pacific Coast Borax Company's Bayonne factory, Balbach Smelting & Refining Co., Devoe & Raynolds paint works, and the Tidewater Oil Co. refinery. There will also be a roof-garden reception at the Majestic Hotel, and a smoker and vaudeville entertainment at Liederkranz Hall. On Saturday, September 11, an excursion will be made up the Hudson river. The trip to St. Louis will begin on Monday, September 12, and terminate Thursday, September 29. During these 17 days visits will also be made to points of interest en route, and on the return trip a day will be spent at Niagara Falls. The headquarters of the society while in New York will be at the Hotel Seville, Madison avenue and 29th street.

TRADE CATALOGUES.

Bulletin No. 6, issued by the International Acheson Graphite Co., of Niagara Falls, N. Y., describes the processes of manufacturing Acheson graphite articles, and points out their peculiar adaptability and convenience.

The Abbe Engineering Co., of New York, in its latest catalogue, gives detailed descriptions of its specialties, and especially laboratory mills, jar mills and pebble mills. The catalogue is well illustrated, and is prepared with evident care.

The August number of the *Cement Age*, a new magazine, deals largely with the use of crusher dust as a substitute for natural sand, in making concrete. The *Cement Age* is devoted to the uses of cement, and is published by Bruce & Johnston, of New York City.

E. G. Ruehle & Co., manufacturers and importers of Swiss mathematical instruments and drawing materials, in their catalogue No. 1, an illustrated pamphlet of 66 pages, give prices of a full line of draftsman's supplies and give particular prominence to the Universal dotting pen, said to be unrivalled in facility of operation and beauty of workmanship.

INDUSTRIAL.

The Atlas Engineering Works of Indianapolis, Ind., has secured a large contract for boilers for shipment to Cuba.

Joseph Bancroft & Sons Co., of Rockford, Del., have just ordered two Sturtevant standard economizers provided with insulated metallic casing for fronts.

No. 3 blast furnace of the Carnegie Steel Co., at South Sharon, Pa., will be ready for blast early in September. The stack will have a daily capacity of about 450 tons. The Carnegie Steel Co. will then have three blast furnaces at South Sharon, with a combined daily capacity of 1,450 tons.

The Tokio Electric Light Co., of Tokio, Japan, has placed a contract for two 1,000-kw. Westinghouse turbines for installation in its power station. The contract was secured through the Japanese house of Takata & Co., of New York, Japanese agents in this country for the Westinghouse Co.

Very favorable results have been reported from the operation of the Little Wonder air hammer rock drill, made by Martin Hardsocg, of Ottumwa, Iowa, at the Fulton Engine Works at Los Angeles, Cal. It is found that the 'Little Wonder' does not 'fitcher' or get 'hung up,' and it does not loose holes.

The Brown-Corliss Co., of Corliss, Wis., has been given a contract for four large vertical cross compound Corliss engines, direct connected to generators, for the Washington navy yard. This is one of the most important installations that has been placed with engine builders within the past year.

The John A. Roebling's Sons Co. will remove its rolling mill from Trenton to Kinkora, N. J., where it has purchased about 200 acres of land. The mill will be enlarged to employ 800 or 1,000 men. The remainder of the plant, employing about 3,000 hands, will be continued temporarily at Trenton.

The King Gas Engine Co., of Iola, Kan., has been organized, and work will be begun on the erection of a plant. The company will build the King gas and gasoline engine and the King gasoline locomotive. The locomotive is for work in mines and for any kind of tram work. The gas engines will be built up to 250-h.p.

Twenty-four ovens in the new Semet-Solvay plant of the Milwaukee Coke and Gas Co. have begun operation. Each of the ovens requires 7.5 tons of coal daily, and the product of the 24 ovens now runs to about 130 tons of coke a day. When the 80 ovens of the plant are in operation the daily product will be between 450 and 500 tons.

The Jones & Laughlin Steel Co. has odered 100 additional coke cars from the American Car & Foundry Co. The cars are of the wooden and steel type, and are for the Monongahela Connecting railroad, the terminal line of the Jones & Laughlin Steel Co. These cars are to meet the increased demands upon the coke department of the company. With the operation of the present furnaces of the company there are nearly 1,500 tons of coke consumed each day.

Articles of incorporation have been filed in New Jersey by W. Trice, of New York, D. Evans, of Pittsburg, and E. Bumford, of Birmingham, for a company to manufacture an improved auxiliary furnace patented by Mr. Bumford. The furnace is to use producer gas under boilers, and, it is claimed, will save 15 per cent fuel and 50 per cent in labor. Complete and smokeless combustion is also claimed. Mr. Trice is president of the company, with D. Evans vice-president, and E. Bumford secretary-treasurer.

The Galitzin tunnel, of the Pennsylvania railroad, 3,600 feet in length, will be equipped with steam fans, to assist in clearing the tunnel of smoke. The tunnel at the mouth or entrance will be enlarged sufficiently to permit the erection of an inner shell or partition at about the normal contour of the tunnel lining. Behind this shell there will be an air space, between it and the tunnel lining proper, into which the current of air from the fans can be delivered without interference from passing trains. By this means a current of air can be forced through the tunnel continuously in one direction.

GENERAL MINING NEWS

ARIZONA.

COCHISE COUNTY.

Copper Queen Co.—It is reported that this company at Douglas will add five furnaces to its smelter. It is now running to its full capacity of 1,500 tons daily.

Ruth.—These mines near San Juan, have been leased to Suplee & Behan for one year.

GILA COUNTY.

Old Dominion.—Machinery for the new smelting plant at this mine, at Globe, is now arriving. The mine is said to have netted $200,000 for the first half of the year.

GRAHAM COUNTY.

Chase Creek.—The tunnel at this mine at Clifton has penetrated the ore vein 30 ft., and it is reported that a high-grade sulphide ore has been found.

MARICOPA COUNTY.

Goddard Mining Co.—The main shaft at this company's mine at Wickenburg is down 175 ft., and good ore is reported.

Wickenburg Mining & Smelting Co.—This company, at Wickenburg, has acquired the Plymouth claim from Frank H. Lyman.

PIMA COUNTY.

Alpha.—It is reported that the breast of the tunnel at this mine at Tucson is in high-grade copper ore.

Gem.—Operations have been resumed at this mine at Tucson. The main shaft will be driven about 500 ft.

YAVAPAI COUNTY.

Cleopatra.—Work has been resumed at this mine, at Jerome. Excellent ore is reported in the Dillon tunnel.

CALIFORNIA.

AMADOR COUNTY.

Sawyer.—At this mine, formerly the Pine, in Pioneer district, a tunnel is being run to tap the vein.

Sutter Creek Gold Co.—At this company's mine, the ore from the shoots is being tested in a 5-stamp mill. There are two 500-ft. tunnels and a small shaft on the property. J. Schenck is manager.

BUTTE COUNTY.

Beik.—This mine, near Forbestown, has been purchased by J. M. Beck and associates, of Pasadena, Los Angeles county.

El Oro Dredging Co.—This company, at Oroville, will shortly begin work on another dredger.

CALAVERAS COUNTY.

Jenny Lind.—While the workmen were excavating for the foundation of a hotel at this place, very rich gold-bearing gravel was discovered.

Reed Gravel.—At this property, near San Andreas, a steam pumping plant is being installed.

San Andreas Gold Channel Mining Co.—A hoisting engine is being put in place at this mine, at San Andreas.

Wide Awake.—At this mine, Railroad Flat, milling tests have failed to save the gold in the ore, the tailings showing about $10 per ton. A small cyanide plant is to be put in.

What Cheer.—The new 5-stamp mill at this mine, near Mokelumne Hill, has been started.

DEL NORTE COUNTY.

Cottage Grove Gold Mining & Milling Co.—This company is to develop 800 acres of mining land along the south fork of Smith river. A dam is to be built and ditch and flume put in. T. H. Griffin is manager. A large gravel bed and certain creek bars are to be worked.

EL DORADO COUNTY.

Big Six Mining Co.—This company has begun work near Georgetown. The mine is one of a group owned by the New Highland Gold & Copper Co., and is under bond to the Big Six Co.

Earl Diggings.—A. A. McDonald has sold to Mrs. Mackenzie, of El Dorado, his gravel mine at this place, 10 miles from Brizzly Flat. A 10-stamp mill will be put in to crush the gravel, which is cemented.

Ida Mitchell Mining Co.—The pump station at the 300-ft. level is completed. Sinking will be resumed at once. A number of eastern stockholders are visiting the property.

Mount Pleasant Mining Co.—A larger steam hoisting plant is to be installed at this mine, Grizzly Flat. The south shaft is 300 ft. deep, and work goes on day and night.

Nigger Flat Consolidated Mining Co.—This gravel property, four miles from Placerville, has been bonded to Colorado Springs men. Development work has commenced.

Rio Vista Copper Mining Co.—This company, on the middle fork of the Cosumnes river, is planning cheaper transportation to the mine. The property is now reached by a grade on the south side of the river.

FRESNO COUNTY.

Apache Mining Co.—This company has resumed work at Trimmer Springs, and found in a drift a 2-ft. vein.

HUMBOLDT COUNTY.

Orleans Bar Gold Mining Co.—This is the only hydraullic mine now running at Orleans, as water is getting scarce. It takes some 700 in. of water for economical work. H. DeC. Richards is manager.

INYO COUNTY.

Death Valley.—Some high-grade quartz has been found in the upper end of this valley, south of Tule canyon and about 12 miles south of Lida. The mine is owned by Reno, Nev., men.

Keeler.—A concentrating plant is to be erected at this place to work 5,000 tons of slag, known as the 'Swauca' slag.

KERN COUNTY.

Sunshine Mining Co.—This company, at Randsburg, for its last clean-up netted $115 per ton. The cyanide plant is in operation.

MADERA COUNTY.

Magnet.—It is probable that extensive operations will be begun at this mine. Dr. Holland and S. W. Ferguson are the owners.

MENDOCINO COUNTY.

Eden Valley.—A promising ledge of copper ore has been discovered near this place by Robert Singleton and W. Ellis, and some rich specimens have been taken out. The work of development has been begun.

NEVADA COUNTY.

El Oro Mining Co.—This property, at Washington, formerly the Yuba, has been shut down about a year, but is about to be started up again.

Iowa Consolidated.—This group, in Eureka district, has been bonded to John McKelvey, of Oakland, Alameda county. Some high-grade ore came from these 10 claims when they were worked, nearly 50 years ago.

McLean.—This gravel mine, between French Corral and Birchville, has been leased by Richard I. Thomas, who is to begin preliminary work at once.

Orleans Mining Co.—The last monthly clean-up shows that the ore milled ran about $40 per ton—an exceptionally good showing, as the general average has been about $25.

Union Hill.—Louis Rosenfeldt, of Rosenfeldt's Sons, of San Francisco, has been at this mine, with a view to purchase. The shaft is full of water, but a 'black ledge' worked by tributers was examined. The mine has been closed some time by the owners.

Zeibright Mining Co.—A rich strike of ore is reported in this mine.

PLUMAS COUNTY.

Five Bears.—Crushing at this mine, Genesee, will begin on September 1. There is a 10-stamp mill, a Kinkead mill and a cyanide plant.

RIVERSIDE COUNTY.

Temescal.—A 20-year lease having been obtained on this tin property, Geo. I. Leonard and associates are reopening it under an option to purchase. The tailings are being worked, and when sufficient concentrates are obtained a run will be made with the smelter.

SAN DIEGO COUNTY.

Julian.—The gold and nickel mines, 12 miles from this place, are to be opened. A 20-ton Payne mill is to be installed. Four companies are working claims at Boulder creek.

SANTA CLARA COUNTY.

Guadeloupe.—This quicksilver mine, near San Jose, has been sold by James V. Coleman, Cecelia d'Andigue and E. F. Preston, to H. C. Davy. It includes 1,250 acres of land, machinery, etc.

Niagara.—D. C. Dedrick, of Weaverville, Trinity county, has taken a lease on this mine, near French gulch.

SHASTA COUNTY.

Broda Mining Co.—This company, at Old Diggings, has begun work on the Keystone mine, under Superintendent Ed. White. The ore is to be shipped to the smelters at Keswick.

Bystel.—On this claim a steam pumping plant and hoist have been installed.

Gambrinus.—The 2-stamp test mill at this mine, Whiskytown,, has cleaned up $1,000 in 15 days' work.

SIERRA COUNTY.

Keystone Mining Co.—At this company's mine, Sierra City, work on the new mill is progressing.

Sierra Buttes.—A cyanide plant is being put on this old property, near the mouth of No. 9 tunnel, on the river.

Golden Scepter Quartz & Gravel Mining Co.—At this mine, near Bunker Hill, Parker H. Mason, superintendent, rich gravel has been struck in an upraise and drift from the old tunnel.

COLORADO.

BOULDER COUNTY.

Jenny Creek Mining & Milling Co.—A good strike of copper-gold ore is reported at this company's mine at Eldora.

Monongahela.—This mine, at Sunshine, has been let out in blocks to lessees.

Village View.—About 400 ft. of tunnel have been driven on this group, on Ute mountain, and a good body of mineralized quartz is said to have been exposed.

CLEAR CREEK COUNTY.

Central Colorado Mining Co.—Work has been resumed on this company's property at Georgetown. An upraise will be put in from the lower tunnel level.

Corbett-Sullivan.—Work is to be resumed on this group, near Idaho Springs. The tunnel is now in 500 ft.

Gold Bug Mining Co.—This company, at Empire, has taken under control the Windsor, Oro Cash and Golden Chariot claims, and will begin active development on them at once.

Snow Bird.—An exceptionally rich strike is reported at this mine, at Camp Shaffer.

FREMONT COUNTY.

Custer Mining & Realty Co.—This company's property at Florence will be developed by cross-cuts from the bottom of the First Colorado level.

GILPIN COUNTY.

(*From Our Special Correspondent.*)

Alps.—This property, on Quartz Hill, is being operated under lease by local parties. They are working at a depth of 1,300 ft., and are taking out smelting ores, the last carload going $150 per ton for first-class, while the second-class went $80 to the ton. James Williams, of Bald Mountain, Colo., is manager.

Cashier Gold Mining & Reduction Co.—A new 60-h. p. boiler is to be installed at the Pittsburg mine of this company in lower Russell district and additions to the top buildings will be made. The main shaft is down 600 ft.

Cataract.—This lode in Russell district has been conveyed to Samuel and Phillip Sternberger for $3,000.

East Boston.—A new boiler and pump will be installed on this property. W. Job, of Central City, Colo., is manager.

Eldorado Mining Co.—Work at this mine is confined to the Eldorado shaft. A shipment of first-class smelting ores, taken from a depth of 100 ft., gave returns of $530 to the ton, while the second-class ores went $210 to the ton. Shipments of milling ores are also being made to the stamp mills, which amalgamate fairly well. The company expects to install machinery and make the Lynn the main shaft of the group, and will sink it several hundred feet deeper, so as to develop on a large scale. Sherman T. Harris, of Russell Gulch, Colo., is manager.

Gauntlet Gold Mining Co.—A contract for sinking the shaft at this mine 100, and possibly 200 ft. deeper, has been let. It is 400 ft. at present. L. D. Hobson, of Central City, Colo., is manager.

Ingalls Gold Mining & Leasing Co.—Operations have been curtailed pending the intsallation of new machinery capable of hoisting from a depth of 1,000 ft. The company contemplates the erection of a mill on the ground. W. Ballantype, Central City, Colo., is superintendent.

Nevada Consolidated Gold Mining & Milling Co.—This company has made arrangements to install an air compressor at its King shaft, in the Nevada district. The tests made with the new concentrating mill are reported to be quite satisfactory. A. M. Rucker, of Nevadaville, Colo., is manager.

Nemeha & Cotton.—The shaft on this property, in Bobtail hill, down 500 ft., is to be sunk to 1,000 ft., and other developments are to be carried on.

Star of Gilpin.—A company is being formed to operate this property, in the Russell district, under a lease and bond. There is a first-class shaft building and plant of machinery on the property, and the main shaft is down nearly 200 ft. Some very good surface ores were formerly taken from the property.

GUNNISON COUNTY.

Raymond.—A rich shoot of ore is reported at this mine, in the Gold Brick district.

West Gold Hill Mining Co.—A 50-ton cyanide mill, generator, and electrical hoist and pump are being installed at this company's mine at Tin Cup.

LAKE COUNTY—LEADVILLE.

(*From Our Special Correspondent.*)

Emmet.—This shaft of the Small Hopes Consolidated Mining Co. is shipping some ore from the 600-ft. level. The principal work being done is development in new territory. From the 800-ft. level, being worked by lessees, some fair ore is shipped. From the R. A. M. dump the company is shipping 1,000 tons a month of ore. The Cary and Result shafts belonging to this company are being worked under lease and a tonnage of 30 tons daily is shipped. The ore is a good iron oxide, carrying some silica.

Big Six.—A drift has been run 300 ft., from the breast of which a raise is going up. The property is on the southern slope of Evans gulch.

Continental Chief.—A wagon road is completed to this property, at the head of Iowa gulch, above timberline. The ore which was stored awaiting the completion of the road will now be shipped. It will run from $40 to $75 per ton. It is silicious, with the values principally in silver.

Coronado.—This shaft has penetrated the mineral zone for 75 ft., and is now entering limestone. It will be sunk 40 ft. to the Cambrian quartzite, and then drifting will be started towards the Penrose.

Onyx.—This mine, on the French mountain, in the Half Moon district, has made another ore shipment; it runs 5 oz. gold per ton, and comes from a surface pocket of quartz sand recently opened. The vein has been stripped for 50 ft. showing an average width of 14 in. The Gold King, at the summit of the mountain, is packing out 14 sacks daily of ore that will run 5 oz. gold per ton.

Yak Tunnel.—The installation of a new electric plant is progressing rapidly and by September 15 the work will be completed. The work of wiring the tunnel and putting in trolley wires and feeders has already reached the Cord winze. The work is in charge of L. F. Jones, of Chicago.

LA PLATA COUNTY.

Chief Mining Co.—This company, at La Plata, is equipping its property with a complete outfit.

Unexpected.—A good body of milling ore is reported at this mine, at La Plata.

OURAY COUNTY.

Camp Bird.—Results of July operations at this mine are as follows: The mill ran 30 days, and crushed 5,899 tons of ore yielding 11,717 oz. bullion and 324 tons of concentrates. From sales were received $209,193 for bullion and $27,978 for concentrates. The expenses were $55,722, leaving a balance for the month's operations of $181,449.

Governor.—Machinery for the 10-stamp mill at this mine is being put in place. About 2,000 tons of ore are now awaiting treatment.

San Pedro Mining Co.—The development tunnel on this company's property in the Sneffels district is to be run 2,500 ft. into the mountain.

Tempest-Apex Mining Co.—This company's mill at Ouray is handling 20 tons of Tempest ore per day. Development is in progress.

SUMMIT COUNTY.

Colorado & Wyoming Co.—A large body of high-grade lead ore is reported discovered at this company's property, at Breckenridge.

Hoosier Gulch Gold Mining Co.—A hoisting plant is to be installed at this company's property, at Breckenridge.

Jackpot-Evening Star.—A promising strike is reported at this mine, near French pass.

Old Union.—A 12-in. streak of zinc ore is reported to have been discovered at this mine, at Breckenridge.

TELLER COUNTY—CRIPPLE CREEK.

(*From Our Special Correspondent.*)

Granite.—A large compressor is being installed on the property on Battle mountain, near the Portland mine. A large amount of ore has been shipped. The property belongs to Messrs. Penrose, Tutt and others. C. C. Hamlin is general manager and D. McCarthy is superintendent.

Henry Adney.—An attempt was made recently to tamper with the machinery; three men removed the bolts from the brake so that the first men on the bucket would have been dashed to the bottom of the shaft. Undoubtedly some of the Federation sympathizers were guilty of the deed. When the fact became known a large number of miners after coming off shift congregated in Cripple Creek, closed up the union store, and escorted its manager, former manager and several well-known Federation sympathizers, including F. Hangs, J. C. Cole, and Eugene Engley, out of town. The deportation was made in broad daylight with no attempt at concealment.

Pharmacist Consolidated Mining Co.—At the annual meeting there is evidently to be a fight for the control of the company. The past year's work has not been particularly successful. E. R. Whitmarsh is manager for the company. This property on Bull Hill was one of the early producers and the first dividend payer in the district.

IDAHO.

CANYON COUNTY.

Cumberland.—The option on this mine, on War Eagle mountain, has been surrendered by the Gold Bullion Mines Co., and it reverts to Arthur Buckbee. A new company will be formed.

IDAHO COUNTY.

H. Y.—A good strike is reported at this mine at Roosevelt.

Sunnyside.—A road is being constructed from this mine to Roosevelt. Machinery for the mine is now en route.

KOOTENAI COUNTY.

Buckhorn.—A 5-stamp mill is to be installed on this claim near Bonner's Ferry.

SHOSHONE COUNTY.

Echo Mining Co.—The lower contact tunnel at this company's mine at Wallace is in 490 ft.

Iron Crown Mining Co.—The middle crosscut tunnel on this company's property at Wallace is in 170 ft. The ore is a heavily mineralized quartzite.

Laclede Mining Co.—Additional buildings will be erected and equipment installed on this company's property near Wallace.

Oom Paul.—A good body of ore is reported struck at this mine in the Burke district.

Snowstorm Mining Co.—No. 3 ore shoot has been encountered in the west drift on this company's property at Wallace.

INDIANA.

DELAWARE COUNTY.

Central Coal, Oil & Gas Co.—The Muncie Trust Co. has been appointed receiver for this company, the Gopher Oil Co. and the Laroca Oil Co., having a combined capital of $1,250,000, on complaint of the Muncie Gas Engine & Supply Co., which charged that the companies are insolvent and unable to pay their debts.

LOUISIANA.

CALCASIEU PARISH.

(*From Our Special Correspondent.*)

Jennings Oil Field.—Crowley Oil & Mineral Co.'s No. 14 well is in. It is in on the extreme east of the field and opens a large tract of undeveloped territory. Production remains about stationary and shipments are brisk.

The Hamilton wild-cat well at Stark is down over 1,000 feet.

Welsh Oil Field.—The field is quiet. Rio Bravo No. 1 continues to flow. Drilling on the Big Mound Oil Co.'s well has ceased at 1,300 ft., but work will likely be resumed.

MICHIGAN.

COPPER—HOUGHTON COUNTY.

(*From Our Special Correspondent.*)

Calumet & Hecla.—Favorable results are reported from the work on the Kearsarge amygdaloid belt. The showing of copper is encouraging and the development of a large mine appears reasonably certain. Three shafts are sinking, No. 19 near the northeastern corner of the tract, No. 20, near the center, and No. 21, at the extreme southeastern end. At No. 19 the foundation for the new 2,000-ft. hoisting engine, with duplex cylinders and an 8-ft. drum, is completed. Sinking is progressing on the permanent shaft, which has been holed through to surface in a raise. Several hundred feet of drifting have been done. No. 20 is raising from the drift on the 100-ft. level of the exploratory shaft. It will meet sinking from surface. Three furnaces at the smelting plant at Lake Linden are being enlarged and improved. Another furnace has gone into blast and 30 men have been added to the payroll.

Centennial.—Rock shipments to the mill at Grosse Point are at the rate of 500 tons daily, one-fifth coming from the stockpiles. Several drills are extending the openings. No. 2 shaft has been holed through to the 18th level.

Tamarack.—Operations in No. 2 shaft have been resumed. This shaft was closed down four months to permit repairs; two sets of timbering have been put in, one within the other, and no further trouble is expected. No. 2 is in the Tamarack's richest territory and will ship 800 tons of rock daily. Work on the new hoist and compressor at No. 5 shaft will be completed in a few weeks, when rock shipments will be increased.

COPPER—KEWEENAW COUNTY.

(*From Our Special Correspondent.*)

Mineral Range Railroad.—A 2-mile extension is being constructed beyond the Mohawk mine to reach camps where timber is gotten out for the Tamarack and Osceola mining companies.

Phoenix Consolidated.—Stamping has been resumed at the mill on Eagle river, sufficient water having accumulated in the dam. Fifteen drills are in commission in the mine, three engaged in extending the new openings. While the two fissure veins upon which work is conducted are narrow, they are uniformly rich in copper and soft, permitting economical mining and milling. Sinking in the St. Clair shaft has reached the 12th level and the West vein shaft is at the 11th level.

COPPER—ONTONAGON COUNTY.

(*From Our Special Correspondent.*)

Adventure Consolidated.—Crosscutting east from the Butler lode to the Evergreen on the sixth level is in 175 ft., with 225 ft. remaining. At present 220 men are employed, 30 being at the stamp mill. Late returns indicate a refined copper average of 19 lbs. per ton of rock.

MINNESOTA.

(*From Our Special Correspondent.*)

The new Zenith furnace at Duluth is running on a mixture of Mesabi and Vermilion ores, making excellent bessemer iron. So far the work has been largely in the nature of experimenting with ores and coke, but the furnace has come up to a daily output of 200 tons iron as low as .07 phosphorus. The coke ovens are working well. The expected Sault contracts for bessemer iron have been closed and daily shipments are made there. Iron below Sault specifications is readily sold in the northwest.

The Crow Wing Iron Co. has been organized at Duluth for exploration in Crow Wing county, about 100 miles west of that city. Where it is hoped an iron ore region may be found. Exploration for a year and more has shown that an iron ore range exists, but so far nothing of value has been found, the ore being lean and silicious. It is thought further explorations may show better ore, or ore valuable in the future, if not now. Lands for a long distance on what is supposed to be the trend of the range have been taken under option and considerable exploration will be done the coming winter. The United States Steel Corporation worked there last spring, but decided to abandon operations after testing the ground.

IRON—MESABI RANGE.

(*From Our Special Correspondent.*)

Arrangements have been made to transfer shipments of Adams and Spruce mines, at Eveleth, to the Duluth & Iron Range railway, from the Duluth, Missabe & Northern, as the latter road has about all it can attend to from mines west of the east line of T58 R18, the Hibbing group and T58 R20 loading it pretty heavily. It has just closed a deal for moving the ore of Iroquois mine, of Rogers, Brown & Co., near Mountain Iron, and is building a spur thereto. From slack business along the eastern Mesabi and the decrease about Biwabik the Duluth & Iron Range road has not been handling as much ore as usual. The double tracking of this road is now complete, except for less than 7 miles, which is to be done this winter.

Sales of Mesabi bessemer ore amounting to more than 50,000 tons have been made to the Lake Superior Company for its furnaces at the Sault. This ore comes from Hanna mines.

Lincoln.—This mine of the Interstate Mining Co. has been closed indefinitely. It was shut down last winter, but was re-opened in the spring, with the intention of producing about 350,000 tons this summer. It is a large and well-equipped underground property and is the chief ore producer for the Jones & Laughlin Steel Co., of Pittsburg. This company's Grant mine will be stripped for extensive mining by the milling process and its stockpile is now being sent forward.

The Biwabik mine, at Biwabik, is producing about 7,500 tons a day, Mahoning at Hibbing nearly 12,000 tons, Fayal is shipping nearly 15,000, and Burt and Stevenson are shipping from 15,000 to 16,000 tons daily. These are the largest mines in the Minnesota field.

Two thousand men are engaged in mines about Hibbing, but this is only half the number employed there a year ago, as some mines have closed entirely and development and exploration are less active. Working mines employ as many men as ever. Those that have closed are chiefly underground properties, that employ more per ton of product.

IRON—VERMILION RANGE.

(*From Our Special Correspondent.*)

Recent newspaper statements regarding the large amount of exploration on this range are utterly without foundation. Nothing of importance is under way but the work on Section 30 and that of the White Iron Lake Co., near 30, and the latter is probably not of great importance. At section 30 the exploration company has been reaming out a hole 325 ft. deep to get out a bit stuck there. Three drills are busy, two in deep holes and the third reaming. The syndicate has not decided what to do about sinking a shaft on lot 6, where is probably the main ore body on the section. At White Iron lake a drill has cut magnetic ore, silicious and lean, at 300 ft., and the company hopes for hematite at about 1,000 ft. The operation is

on a part of the Vermilion formation that is generally supposed by mining engineers to be decidedly magnetic.

MONTANA.

CASCADE COUNTY.

Boston & Montana.—This company's refinery at Great Falls, which has been idle since last fall, has started one furnace.

DEER LODGE COUNTY.

Anaconda Copper Mining Co.—The concentrator building at Anaconda was burned August 16. The building has not been in use since the Washoe smelting works were blown in.

FERGUS COUNTY.

Drake-Wright.—The shaft at this mine in the Kendall district is down 230 ft., and good results are reported.

Handicap.—This claim, adjoining the Barnes-King property in the Kendall district, will be developed by George H. Stanton and Homer Armstrong, of Great Falls. Prospecting with a diamond drill will be done.

Kendall Mining Co.—The annual statement of this company gives the cash value of its property at $2,300,000, with no debt except the ordinary expenses.

FLATHEAD COUNTY.

Snowshoe.—The holdings of D. P. Bowers in this mine, 20 miles south of Libby, have been sold to Thomas A. Noble and associates.

LEWIS AND CLARKE COUNTY.

Silver District.—A rich strike is reported in this district on the middle fork of the Big Blackfoot.

MADISON COUNTY.

Bonanza.—It is reported that this group of claims in the Parry district will be sold to Eastern parties.

Conrey Placer Mining Co.—An additional dredge boat is to be put in by this company at Ruby.

Watseka Mining Co.—It is reported that this company has received a lease and bond on the New Home claim at Rochester.

PARK COUNTY.

Montana Coal & Coke Co.—The mines of this company at Horr and Aldridge have been closed down indefinitely. Four hundred men are thrown out of work.

SILVER BOW COUNTY.

Pittsburg & Montana Copper Co.—Work on the long crosscut between the two working shafts at Butte is progressing rapidly. It is expected that it will be completed within 90 days.

Speculator.—This mine at Butte is reported to be yielding 300 tons of ore daily.

NEVADA.

ELKO COUNTY.

Greenback.—This mine, at Mountain City, has been purchased by Samuel Newhouse for $40,000.

Kunz.—Work has begun on this group, at Mountain City. The ore carries gold and silver. M. M. Johnson has charge.

Resurrection.—R. R. Ives, of Ogden, is manager of this property, at Mountain City.

ESMERALDA COUNTY.

Black Ant Mines Co.—This company has begun work on a group of claims at Goldfield, adjoining the Vernal group.

LINCOLN COUNTY.

Pompeii Mining Co.—A good strike is reported on this company's property at Searchlight.

Horseshoe.—This mine, at Fay, has reverted to the Horseshoe Gold Mining Co. through the failure of the Shawmut Gold Mining & Milling Co. to make its payments.

Quartette.—A good strike is reported on the 700-ft. level of this mine at Searchlight.

LYON COUNTY.

Bluestone.—This copper property, at Yerington, is reported sold to Capt. J. R. De La Mar for $125,000.

NORTH CAROLINA.

GASTON COUNTY.

Carolina Tin Co.—This company claims to be shipping tin ore at a profit from mines at Bessemer City, and from the Ross mine, near Gaffney, S. C.

OREGON.

MALHEUR COUNTY.

(*From Our Special Correspondent.*)

Black Eagle Mining Co.—The 11 lode claims of this company are near Malheur, 28 miles southwest of Huntington, an old placer mining camp where activity was greatest 30 years ago. The group has been considerably developed within the last year or two by open cuts and adits, which open a gold-bearing quartz and porphyry belt from 1,000 to 1,500 ft. wide. In the cuts a face of ore 54 ft. deep is exposed by winzes. Most of the ore is oxidized and tolerably free-milling; but with depth it becomes more of an iron sulphide. The 20-stamp mill, with plates, has crushed as much as 100 tons per day, the saving running from $3.50 to $4 per ton, or only about 60% of the assay value. It is said the cost of mining and milling has not exceeded 68c. per ton. A small cyanide plant will be erected; if successful a large crushing and leaching plant will be erected next year. This is a Minneapolis company, A. Kime being manager, and Mr. Bass, metallurgist.

Commercial Mining Co.—This company, having 8 claims in the upper end of Mormon Basin, between Malheur and Rye valley, is controlled by Portland, Ore., people, including W. E. King, who is manager. The ore is a gold-bearing quartz, showing some gold-bearing sulphides. A small Hendy stamp mill will soon be in operation. It was built by Giles Weller, who erected milling plants at Ely, Nev. A force of 12 men is employed. Mr. King says that the ore will run $40 per ton in gold, and expects to save 80 to 85% by amalgamation. A Johnson vanner will make a concentrate of the sulphides that pass over the plates.

Pedro.—James Conley is running a 3-stamp mill on Dixie creek, by which he states that he saves 40% of the gold on plates, making a concentrate that runs 30 oz. gold and 30 oz. silver to the ton.

Rich Creek Placer Mines.—The ground on Rich creek, near Malheur, owned by W. C. Culbertson and T. B. Barbee, of Carroll, Ia., is supplied with water from a ditch 120 miles long, which takes water from the Blue mountain streams to the south of Sumpter. This ditch was constructed many years ago when placer mining was most active. The property is now operated with a small force.

PENNSYLVANIA.

ANTHRACITE COAL.

Delaware & Hudson Co.—The Marvine and Dickson breakers of this company will be abandoned as breakers, and turned into washers. The company is having a power house erected at Leggett's Creek colliery by the Westinghouse Electric Co. for generating electricity to run the hoisting engines and haul cars in the mines.

Blackwood.—It is stated that the Lehigh Valley Coal Co. will install a plant for handling coal at this colliery, near Wilkes-Barre, which has long been idle. The company will sink a new shaft and erect a breaker.

Middle Lehigh.—This colliery, which has been idle for 15 years, is to be re-opened. Six large pumps are in place to remove the water. The colliery will employ 400 hands.

Morea.—This colliery at Mahanoy City, which has been idle for some time, has resumed operations. It employs 800 men and boys.

Natalie Anthracite Coal Co.—The Dodge & Hughes Trust Co., of Philadelphia, has announced that the receiver, who is also trustee under a mortgage held by the Trust company, will sell the property of this company, near Shamokin, on October 5, at Pittsburg. The company's holdings are said to make a tract of land 7 miles long and 0.75 mile wide.

Susquehanna Coal Co.—By a 'squeeze' at the Pine Hill colliery, on August 24, four men were entombed in a gangway 1,000 ft. below the surface.

BITUMINOUS COAL.

Brier Hill Coal & Coke Co.—This company has let a contract to Weller & Gray, of Uniontown, for a large electric plant to supply power and light to its coke plant, near Uniontown.

Domestic Coal Co.—The engine room of this company at Monongahela was destroyed by fire, August 21, which resulted in a loss of $6,000 and stopped work at the mine.

Dunbar Furnace Co.—Six damage suits, aggregating $80,000, have been filed against this company, of Uniontown, as a result of the explosion in the Ferguson mine, November 21, 1903.

Pittsburg Coal Co.—The Chicago & Northwestern railroad has awarded the contract for supplying 150,000 tons of the best Pittsburg vein steam coal, to this company, to be delivered at the railroad docks at Ashland, Escanaba and Sheboygan.

TEXAS.

HARDIN COUNTY.

(*From Our Special Correspondent.*)

Batson Oil Field.—Wilson & Broach have brought in a well that is flowing 1,000 bbl. daily on the Parafine Co. property. Some 40 wells are being drilled. Among others are: The Guffey Petroleum Co., 6; F. Neville Parifine Oil Co., 3; Mary Ellen Oil Co., 1; Heywood Oil Co., 2; Lone Acre Oil Co., 2; Crown Oil Co., 2; Weyant & Carlson, 1; J. Miller, 1; Woldrup & Smith, 1; Fowler & Lane, 1; G. W. Carroll, 1; Foster Oil Co., 1; D. Steele, 1; E. S. Taylor, 1; L. A. Bentley, 1; Moonshine Oil Co., 2; W. M. Kizer, 1; J. Swayne, 1; Higgins Oil & Fuel Co., 1; T. J. Wood, 1; Gilbrough & Chech, 1; Bodner Oil Co., 1; Santa Fe, 1; K. Hamil, 1; Steele & Sturm, 1.

Saratoga Oil Field.—The Santa Fe No. 2 well is still flowing and the field in the vicinity will be rapidly developed. The Guffey Petroleum Co. is drilling its property. Rio Bravo No. 215 has been brought in and is flowing moderately.

WASHINGTON.

FERRY COUNTY.

(*From Our Special Correspondent.*)

Mountain Lion.—This mine has been unwatered to the 425-ft. level, and ore is being stoped between that and the 300-ft. for converter lining at the Granby smelter.

OKANOGAN COUNTY.

(*From Our Special Correspondent.*)

Ruby.—It is reported that nearly 90 tons of ore have been shipped from this mine since last April, and about 30 tons at the mine now await shipment. The No. 2 tunnel on the Ruby has developed the vein to a depth of 90 ft. on the dip. Drifts have developed the vein 900 ft. in length on this level. Another tunnel is in 200 ft. A mill to treat the ore by the Baker-Burwell electro-chemical process will be installed. The ore is chiefly sulphantimonite in character, with allied minerals. An analysis of a number of combined samples showed the following contents: Silver, .986 per cent; lead, .383 per cent; copper, 5.18 per cent; iron, 2.716 per cent; zinc, 2.121 per cent; sulphur, 3.786 per cent; antimony, .252 per cent; arsenic, .853 per cent; aluminum oxide, .79 per cent; magnesia oxide, .254 per cent; calcium oxide, .68 per cent; with $1.40 in gold per ton. Munroe Harmon is manager.

FOREIGN MINING NEWS.

CANADA.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Boundary Ore Shipments.—Shipments for the week ending August 20 were as follows, in tons: Granby, 10,660; Mother Lode, 4,192; Emma, 1,452; Oro Denoro, 99; Mountain Rose, 33; total for week, 16,636; total for year to date, 515,451.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Rossland Ore Shipments.—Shipments for the week ending August 20 were as follows, in tons; Le Roi, 1,775; Centre Star, 1,500; War Eagle, 1,140; Le Roi No. 2, 440; Le Roi No. 2 (milled), 300; Jumbo, 300; Cliff, 80; Velvet-Portland (milled), 250. Total for week, 5,785; year to date, 224,978 tons.

MINING STOCKS.

(Full quotations on page 374 and 375.)

New York. Aug. 31.

(Full quotations on pages 374 and 375.)

The stock market is still purely professional in tone, but the strength in prices and limited sales indicate that the fall will see outside buying. Amalgamated copper is higher, touching $58, the record this year. Anaconda was also stronger, selling up to $20. Tennessee came forward at $29.375@$29.25, and Greene Consolidated at $14.25@$14.50.

American Smelting & Refining securities were particularly strong, though sales have not been large. A record price of $107.75 for the preferred stock was made on August 17, and this week $107 was reached with prospect of going higher. Common shares are also in good form, selling at $64. Advance in the price of lead, and speculation as regards the proposed lead manufacturers' merger, are two reasons for this strength.

In the gold and silver shares business is of a routine character, brokers taking profits whenever prices show a fractional gain. Talk of unwatering the south end mines on Gold hill has added flavor to the Comstock group, but as yet the assessment-burdened shareholder is slow to make new purchases.

Boston. Aug. 30.

(From Our Special Correspondent.)

The much talked of copper boom seems to be at hand, and trading in this class of securities has been on an abnormally large scale. In fact, business in the Boston Stock Exchange is the largest in over a year's time, and up to the present time there is no likelihood of a cessation in these movements. The trading this week has been led by Utah Consolidated, and Isle Royale, although the whole mining share list has been active and strong. Isle Royale has moved up almost $5 to $20.25, while Utah, with over double the share capital, has gone up over $4 to $43.25; the latter subsequently went back to $42 on profit-taking. Considerable buying has emanated from the Lake district. Isle Royale has apparently struck it very rich, according to late information from the property.

The story is again current that Utah will be taken over by Amalgamated, share for share. Osceola, on a smaller amount of trading, has gone up $8.50 to $73, with $1.50 reaction subsequently. Increased dividend prospects are cited in this case. The sharp advance in Allouez to $15 brought considerable realizing, although the stock records a net gain of $2, for the week. Atlantic touched $15, closing $1, better than a week back at $14.37½. Centennial was well bought, advancing the price $4.37½ to $28.87½, on reports that an offer equal to $35 for the 10,000 shares of treasury stock had been refused. Copper Range has been fairly active, and went up $2.75 to $57.50, reacting 75c. Old Dominion is $2 higher at $15.50, and there is talk of a movement in this stock. Mohawk, in sympathy with the rest of the list, made a $3.50 advance to $46.50, closing $1 below this.

Montana Coal and Coke, which has been dormant for some time, sprang into activity and advanced $2.62½ to $6.75. Reports from New York state that the experts sent out to report for the Amalgamated Co. find things better than first thought. Franklin is up $1.50 to $9.50, Parrot $1.25 to $25.75, and Bingham $2.12½ to $27.37½. United States has been a laggard, being but a fraction better than a week ago at $22.25. This stock is usually a leader in the market, and there are those who predict that it will take this place before long. Boston Consolidated took on a little life and advanced almost $1, to $7.12½. Adventure is up $1, to $2; United States Coal & Oil $2.50 to $12.50; Calumet & Hecla, $25 to $520; Tamarack $11 to $108, and Wolverine $7 to $88. Shannon was well supplied at $3.75, but crossed $4 to-day.

Twenty-one active copper shares show a net average advance of $18 from the lowest price of the year; while some are higher than the best prices of 1903. Mexico Consolidated is firm on the curb around $11.50. Sales of Ahmeek mining are reported on the curb at $24.50@$24 and Seneca at $17.50@$18.25.

Colorado Springs. Aug. 26.

Trading in Cripple Creek shares has been much livelier on the local exchange during the past week than for some time. Several stocks made quite marked advances and a greater number were dealt in. Increased activity in camp and the numerous good strikes that have been reported recently seem to be the cause of this condition.

The Shurtloff and Findley properties are planning a consolidation to be voted on October 1. As these properties have ore-bodies which adjoin, it will make a strong combination. Leasing is reported to be on the increase and good leasers with strong financial backing are more numerous than for several years. It is said that 40% of the gold values in camp are the result of leasing.

El Paso has made a gain during the week of 3c., closing to-day at 94½c. Elkton sold to-day for 64¾c. C. K. & N. sold during the week for 36c. Portland sold to-day for $1.58. Isabella is selling for 20½c. Cripple Creek Consolidated has advanced during the week from 8¾ to 9⅛c. Old Gold is selling for 11½c. Gold Dollar has advanced 1⅛c., closing to-day at 6⅝c. per share.

Salt Lake City. Aug. 27.

(From Our Special Correspondent.)

The week on the exchange has been generally dull, but the activity in a few of the favorite stocks gives some life to the market. Prices have not fluctuated to any great extent, and the slight decrease has been due to light trading. However, the closing tone of the market was much firmer, and renewed activity is anticipated in the fall.

Daly-West made the most conspicuous gains during the week, jumping from $13 to $13.87½, and closing strong at $13.60. On the open board, Columbus Consolidated ruled as favorite and made steady gains throughout the week. May Day, New York and Star Consolidated were also actively dealt in, with slight advances in prices and quite a number of sales noted. Tetro and Daly suffered during the week, and a few of the lighter stocks fell off a few points. On account of the rumored deal on the Daly-Judge, this stock was much stronger, with but little of it on the market.

With the exception of the Goldfield-Bonanza there was no trading in Tonopah stocks. The bidding in these, however, was higher, and several made material advances. During the week the Century paid a dividend of $3,000, and Uncle Sam one of $5,000.

San Francisco. Aug. 25.

(From Our Special Correspondent.)

A little interest has been excited by the proposed plan for unwatering some of the old Gold Hill mines. The stocks of that section were in somewhat better demand and at higher prices. The rest of the market was rather quiet.

Some prices noted are: Ophir, $2.60; Consolidated California & Virginia, $1.15@$1.20; Mexican, 93c.; Caledonia, 55@58c.; Silver Hill, 54c.; Belcher, 28c.; Gould & Curry, 24c.; Yellow Jacket, 22c.; Chollar, 18c. per share.

On the San Francisco & Tonopah exchange the market was generally steady, with only small fluctuations, and there was a fair demand for stocks. Montana Tonopah sold at $2.30; MacNamara, 41c.; Tonopah Midway, 43c.; Red Top, 16c. per share.

On the California exchange, sales of oil stocks were moderate, but prices were generally steady. Business, however, was chiefly in small lots. Sterling brought $2.35; Home, $1.35; Monte Cristo, 60c.; Four Oil, 59c. per share.

COAL TRADE REVIEW.

New York, Aug. 31.

ANTHRACITE.

The anthracite trade remains dull. Prices to-morrow go back to the winter schedule, or, to put it more correctly, the discount season ends to-day. The production of coal is being restricted by all the large companies in one way or another. The Philadelphia & Reading and the Lehigh & Wilkes-Barre collieries close for a week, beginning to-night. The Lehigh Valley closed its mines for two days this week, and other companies are closing mines here and there, to suit their convenience. It is now said that because of the generally good supplies in dealers' hands, and a probably light demand until cold weather, the large companies believe that the market during September will not need over 4,000,000 tons. In the present condition of the trade this estimate is undoubtedly liberal; probably 3,500,000 tons is nearer what the market will require, but it is much easier to increase than to restrict output.

Trade in the Northwest is slack. Heavy arrivals have filled upper lake docks and receipts are likely to fall off until there is a more liberal movement from the docks to inland points. In Chicago territory there has been a sight increase in buying during the past 10 days to take advantage of the last days of discount, but this movement was not heavy, and no great activity is expected in the trade until cold weather comes. Arrivals of all-rail coal are sufficient for all demands. Along the lower lakes and in Canadian territory dealers are well supplied, retail business is of little account, and the market is generally dull. Along the Atlantic seaboard there has been little increase in buying because of dealers wishing to take advantage of the 10c. discount. Supplies at all points appear to be sufficient for present needs, and it is not likely that there will be much increase in buying until cold weather is near. The steam sizes continue in superabundant supply, and can be had from independent producers for less than what is asked by the large companies. The regular price schedule, for prepared sizes, which goes into effect to-morrow, is: Broken, $4.75; egg, stove and chestnut, $5, f. o. b. New York harbor shipping ports.

BITUMINOUS.

Demand in the Atlantic seaboard bituminous trade shows no improvement, and the market remains dull. The lowest grades of Clearfield can be had for $2.25, with gas slack at the same price, while fairly good Clearfield is selling for $2.40@$2.50 f. o. b. New York harbor shipping ports. The market situation is somewhat better than it has been, in that comparatively little demurrage coal is now standing at tidewater.

The Seaboard Carriers' Association has tied up a lot of its larger craft, but some parties to the association agreement are reported not adverse to considering charters when their side of the bargain can be covered up by alongside or delivered prices. Still the association agreement is lived up to fairly well, though Norfolk and Newport News are the only ports where shippers generally are agreeing to its terms. There seems to be a little improvement in all-rail demand, though all-rail shipments to the far East are cut into materially by coastwise shipments of Pocahontas and New River coal to Eastern unloading ports.

Trade in the far East is dull. It is believed that most consumers have rather larger supplies on hand than they usually have at this season. Along Long Island Sound demand is lighter. At New York harbor points some shippers say they have some business to attend to, but generally trade is pretty quiet. All-rail trade is active, and producers are holding prices fairly firm, with the demand for coal increasing.

Transportation from mines to tidewater is generally prompt. Car supply at the mines is up to the demands of producers. In the coastwise vessel market a considerable number of the vessels covered by the association agreement are tied up, but enough outside craft are to be had to supply the limited demand for large vessels. Small craft is inclined to be in short supply. We quote current rates from Philadelphia as follows: Providence, New Bedford and Long Island sound, 60c.; Boston, Salem and Portland, 75c.; Portmouth, 80c.; Lynn, 85@90c.; Newburyport, 85c.; Bath, 75@80c.; Bangor, 90c.; Gardiner, 85c. and towages; Saco, 90c. and towages. From Norfolk and Newport News rates are 90c. to around Cape Cod, and 75c. to Sound points. From New York harbor rates are 60c. to around Cape Cod.

Birmingham. Aug. 27.

(*From Our Special Correspondent.*)

Both sides in the controversy, operators and union workers, claim to have the situation in Alabama well in hand, and the strike is still on. The operators are making efforts to work their mines with non-union labor and are meeting with some success. Several of the operators assert that their coal production is increasing right along, and as soon as they can get possession of their houses, after September 1, they expect to secure a large amount of labor to take the places of the strikers. The miners, on the other hand, claim that they are still in control of the situation, and with the assistance being rendered by their national organization and an assessment made on all members who are working under the temporary plan, they can hold out for a long time. There is a heavy production of coal at the mines operating under the temporary contract with union miners and with non-union and convict labor. The demand for coal and coke is excellent, and prices [illegible]. There is a wholesale shipment of coal from this State down the Mississippi river. Besides the Pittsburg Coal Co., which owns and operates mines in the western part of Walker county, and also a barge line between Greenville, Miss., and New Orleans, the Clifton Coal & Coke Co., with headquarters in Greenville, Miss., operating a barge line from Greenville to Natchez and Vicksburg is now commanding attention. Mr. George Clifton, president of the concern, states that coal is being moved by his company in quantity, and he expects that the annual movement would aggregate 75,000 tons. The company has two tugs, one tow boat and 18 barges. Coal is bought from producers in Jefferson and Walker counties, Ala., and the tipple of the Southern railway at Greenville, Miss., is used in loading the product at the starting point of the barge line.

Considerable coke is being brought into the district from West Virginia to supply the furnaces hereabouts while the production of that material is curtailed by reason of the strike.

Chicago. Aug. 29.

(*From Our Special Correspondent.*)

With the prospect of an advance September 1 to the full circular price of anthracite for the year, the trade in anthracite has been somewhat better in the last week than in previous weeks. Dealers expect that the coming month will show the beginning of the brisk business that is certain to come with the first approach of cold weather. There can be no questioning that the consumers and the retailers of Chicago territory will rush for supplies when these are needed, and the foresighted ones will make a fair business for September, in all probability. Both from the country and the city in the last four or five days have come orders that are significant of a desire to take advantage of the last 10c. discount for the list price. Receipts of anthracite continue heavy enough to preclude the fear of any shortage for the winter.

Business in bituminous is still weak, there being apparently too much low-grade coal mined for the market. Consumption has been fairly well up to the normal for summer, as nearly as it can be estimated. The only firm spot in the bituminous market seems to be in domestic sizes, which are growing in demand. Screenings and the cheaper run-of-mine are very weak. Illinois and Indiana lump range $1.70@$2.40; run-of-mine $1.40@$1.60; screenings, 90c.@$1.50. Hocking is in good and steady demand at $3, with some difficulty in getting the coal forwarded fast enough. Smokeless is still in light demand, but the price is fairly well maintained at $3@$3.15, and there is no preponderance of supply over demand, which has caused much trouble in the past. Youghiogheny is in good demand at $3. Eastern coals generally are in better condition than Western, in the local market.

Cleveland. Aug. 30.

(*From Our Special Correspondent.*)

The Lake coal trade has not been quite so brisk, but has almost held its own. It is found that the shipment up to July 1 this year was 2,000,000 tons short, in bituminous coal alone, of what it was a year ago. The shipments for July and August have no more than held their own with last year. The shortage this fall will be rather extensive, therefore. It is now found that a good deal of the coal used in the Northwest is coming from fields further west. Rates have barely held steady. The tonnage on the lakes is abundant, and, in fact, seems to be in excess of the normal requirements.

The demand for steam coal is about as it has been. The market is steady, but does not show any material improvement. The price holds about 90@95c. at the mines for both Ohio and Pennsylvania coal. The price of slack holds about steady. It ranges 20 to 25c. at the mine, with the former price more nearly the market. On contract some mines are accepting 50c., although the others are holding for higher prices. The strong point of the market just now seems to be in domestic coal. Massillon coal is in good demand, at $3 at the mines. Some [illegible]ers have been covering, anticipating an advance.

Pittsburg. Aug. 30.

(*From Our Special Correspondent.*)

Coal.—The local trade shows some improvement this week owing to the starting of a number of idle mills and prices are somewhat firmer. The shipments to lake ports continue, the tonnage to date exceeding all former years. All the mines are in steady operation and prospects seem to be unusually bright for both the miners and operators. No change in prices is noted and run-of-mine continues to be quoted at $1@$1.10.

Connellsville Coke.—Announcement is made that from 1,000 to 1,500 additional ovens will be put in blast about the first of the week. Both production and shipments have improved owing to the blowing in of several blast furnaces by the United States Steel Corporation. Prices remain about the same, $1.50 for furnace coke and $1.85@$2 for foundry. The production for the week is given at 158,481 tons. The shipments amounted to 8,447 cars, distributed as follows: To Pittsburg and river points, 3,374 cars; to points west of Pittsburg, 3,821 cars; to points east of Everson, 1,252 cars.

San Francisco. Aug. 25.

(*From Our Special Correspondent.*)

The market continues quiet, with about the usual arrivals.

Pacific coast coals in large lots to dealers are quoted as follows: Wellington and New Wellington, $8; Richmond, $7.50; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; white ash, $5.25. For Rocky Mountain coals, ex-car, to dealers, prices are $14 for Colorado anthracite, $11.50 for Castle Gate, Clear Creek, Rock Springs and Sunnyside. Eastern coal is nominal at $14 for Pennsylvania anthracite and $13 for Cumberland. Foreign coal in cargo lots is quoted at $13 for Welsh anthracite, $8.50 for cannel and $7.50 for Wallsend and Brymbo.

Foreign Coal Trade. Aug. 24.

Exports of coal and coke from the United States for the seven months ending July 31 are reported as below, by the Bureau of Statistics of the Department of Commerce and Labor:

	1903.	1904.		Changes.
Anthracite	1,339,135	1,402,057	I.	62,922
Bituminous	3,347,826	3,386,041	I.	38,215
Total coal	4,686,961	4,788,098	I.	101,137
Coke	239,985	311,102	I.	71,117
Totals	4,926,946	5,099,200	I.	172,254

Shipments of coke were chiefly to Mexico. Exports of coal were distributed as follows:

	1903.	1904.		Changes.
Canada	3,674,920	3,566,938	D.	107,982
Mexico	474,248	544,550	I.	70,302
Cuba	232,438	257,174	I.	24,736
Other West Indies	130,186	159,994	I.	29,808
France	2,938	9,704	I.	6,766
Italy	36,854	53,580	I.	16,726
Other Europe	13,905	39,452	I.	25,547
Other countries	121,472	156,706	I.	35,234
Totals	4,686,961	4,788,098	I.	101,137

Exports to Canada have not yet made up the shortage of the first quarter of the year. Other exports generally show considerable gains.

Messrs. Hull, Blyth & Co., of London and Cardiff, report under date of August 20 that the market is very dull, and scarcely any fresh business is doing. Quotations are: Best Welsh steam coal, $3.60; seconds, $3.54; thirds, $3.30; dry coals, $3.42; best Monmouthshire, $3.30; seconds, $3.24; best small steam coal, $2.10; seconds, $1.98; other sorts, $1.80.

The above prices for Cardiff coal are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, both exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½% discount.

The freight market continues very dull and weak. Some rates quoted from Cardiff are: Marseilles, $1.20; Genoa, $1.08; Naples, $1.08; St. Vincent, $1.44; Rio, $2.04; Santos, $2.46; Buenos Ayres, $1.74.

IRON TRADE REVIEW.

New York, Aug. 31.

The iron markets show some improvement here and there, and there is apparently somewhat more firmness in prices, with a slightly increased disposition to order material ahead. On the other hand, we hear of some holding back of specifications on contracts already made. Upon the whole the market does not seem to have made much advance, or to show any material changes from last week; but such changes as can be recorded are slightly for the better. The details will be found in our local letter, which follow.

Exports and Imports.—Exports of iron and steel, including machinery, from the United States, in July and the seven months ending July 31, are valued by the Bureau of Statistics of the Department of Commerce and Labor as follows:

	1903.	1904.		Changes.
July	$9,021,668	$9,990,247	I.	$968,579
Seven months	57,103,491	70,984,791	I.	13,881,300

The July exports this year were somewhat below those of May and June. The increase for the seven months was 24.3%. The chief items of exports for the seven months were as follows, in long tons:

	1903.	1904.		Changes.
Pig iron	9,196	26,324	I.	17,128
Bars	25,016	31,476	I.	6,460
Rails	4,753	174,642	I.	169,889
Sheets and plates	9,978	19,382	I.	9,404
Structural steel	19,145	26,124	I.	6,979
Wire	62,551	66,992	I.	4,441
Nails	24,544	24,562	I.	18

The most notable increase was in rails. Of the rails exported this year 73,371 tons went to Canada, 60,760 tons to the Far East and 16,483 tons to Mexico.

Exports of iron ore for the seven months were 10,624 tons in 1903, and 48,932 tons in 1904; an increase of 38,308 tons. This was due chiefly to some special exports of Lake Champlain ore to Germany.

Imports of iron and steel into the United States, for July and the seven months ending July 31, are valued by the Bureau of Statistics as follows:

	1903.	1904.		Changes.
July	$3,529,676	$1,905,806	D.	$1,623,870
Seven months	28,849,425	12,998,003	D.	15,851,422

The decrease for the seven months was 54.9%. The principal items of these imports for the seven months were as follows, in long tons:

	1903.	1904.		Changes.
Pig iron	490,497	48,102	D.	442,395
Billets and bloom	209,300	7,493	D.	201,807
Scrap iron and steel	66 745	8,894	D.	57,851
Bars	26,097	13,111	D.	12,986
Wire-rods	12,032	9,516	D.	2,516
Rails	75,730	34,028	D.	41,702
Tin-plates	30,563	41,968	I.	11,405

The only item showing an increase was tin-plates. Imports of iron ore for the seven months were 569,895 tons in 1903, and 198,868 tons in 1904; showing a decrease of 371,027 tons this year. The larger part of this ore came from Cuba.

Birmingham. Aug. 29.

(*From Our Special Correspondent.*)

The Alabama pig iron market holds up well under contrary conditions. There is not a very strong demand, but the quotations are firm at $9.50 for No 2, foundry. A report that some firms in this district were offering the product at $9.25 is not to be verified, and sev-

eral manufacturers asked reply that $9.50 is the common figure. The production in Alabama is still somewhat curtailed, the strike of the union coal miners having its effect. During the past week the Sloss-Sheffield Steel & Iron Co. blew out one of its city furnaces, repairs being necessary about the plant. This company has five furnaces in operation. The Lookout Mountain Iron Co. has not yet blown in the Battelle furnace. It is understood that during the week the Woodward Iron Co. will make an effort to start up one of the Woodward furnaces, having quite a number of men at work in the mines and about their coke ovens. The Republic Iron & Steel Co. is still unable to operate more than one of the three furnaces at Thomas, while the Tennessee Coal, Iron & Railroad Co. has four furnaces at Ensley, one at Bessemer and one at Oxmoor, in operation. The Lacey-Buek and the Tutweiler Coal, Iron & Railway Co. each has a single furnace in blast. The Alabama Consolidated Coal & Iron Co. has three furnaces in blast. The Shelby Iron Co. (charcoal) has one furnace going.

The following quotations are given: No. 1 foundry, $10; No. 2 foundry, $9.50; No. 3 foundry, $9; No. 4 foundry, $8.50@$8.75; gray forge, $8@$8.25; No. 1 soft, $10; No. 2 soft, $9.50.

No sales of large proportions have been made in this district recently; in fact, all deals now being consummated are mostly in 100 to 300-ton lots.

There is no change in the finished iron and steel situation. The only rolling mill attempting to do anything in this district is that of the Tennessee Coal, Iron & Railroad Co., at Bessemer, where non-union labor is employed in two of the departments.

Chicago. Aug. 29.

(*From Our Special Correspondent.*)

For the last week the trade in pig iron has been about stationary; and on this account the pessimistic element of the selling agents has begun to indulge in forebodings of a slip backward again. There seems no good reason for such apprehensions, for there is a fair business now, though inquiries are much more plentiful than orders. If there has been no forging ahead, there has been no falling behind, and the market for northern iron is decidedly more healthy than it has been for a long time. The flurry in the steel world has not affected the pig iron business notably and nothing indicates calamity. Sales of southern are mostly on three to six months deliveries, with the tendency of buyers to seek longer-term contracts than sellers are willing to accede to, under present prices. Northern furnaces are holding up stiffly to their advanced prices and are doing a larger share of the business than they ordinarily do, and getting most of the long-term business.

Quotations are the same as last week: $13.15 @$13.40 Chicago for southern ($9.50@$9.75 Birmingham), and $13.50@$14 for northern.

Coke continues firm, with a little brisker demand than last week, and no surplus on track, the price of Connellsville being $4.65@$4.75, as last week.

Cleveland. Aug. 30.

(*From Our Special Correspondent.*)

Iron Ore.—The market has hardly moved one way or the other. Sales have about been suspended for this year, the demand having been satisfied. There is no change in rates, the bottom having been reached and shippers paying the old rates to keep the vesselmen from laying up their boats. The movement from the lake docks to the furnaces is a little heavier, indicating that old stocks are beginning to run out.

Pig Iron.—Buyers are taking less material for immediate shipment, preferring to specify against their old contracts. This indicates that they fear an oversupply later on. For advanced use the buying is not quite so heavy. A large demand has been satisfied, and in excess of that there does not seem to be so much call for the material. Besides buyers are shying at the higher prices for which producers are holding. The markets rests now upon the higher basis of $12 for No. 2 in the Valleys for immediate shipment and $12.25 for the same grade for future delivery. In some instances these prices are shaded, but they are exceptional. There is a slightly better call for malleable at unchanged prices. The market for basic and bessemer does not seem to be quite so brisk.

Finished Material.—The market has been somewhat better here of late for some grades, while showing that in others there is a strong tendency to break existing prices. For instance, there is a good call for light rails with the supply short. There is also a better demand for sheets, in which the prices are stable, with some talk of an advance. In that respect the mills are holding off for the time being, not desiring to force an advance in prices in the face of an imminent break in the other grades. The base price holds steady at 2.50c. for No. 27 black sheets out of stock. In bar steel there is a firm and steady market, but the bar iron market has gone to pieces. In some instances sellers have gone as low as 1.20c. at the mill, while quotations of 1.25c. at the mill have not been uncommon. A few mills are holding for 1.30c. at the mill.

There is, however, a determined effort to break the market for plates and shapes. This has been very plainly seen here of late. The reports, emanating from buyers, have been that cuts have been made on both plates and shapes. The inquiries, with which these statements have appeared, have re-appeared significantly, indicating that perhaps the market is stronger than seemed to be the case, when the reports first came out. In addition some new ship construction is pending and the ship-building concerns have been trying to beat down the price of steel. The market has resisted these efforts to keep the prices down. No big sales have been made at a reduction. The stubborn stand of the mills has, in fact, brought about a period approaching stagnation.

New York. Aug. 31.

Pig Iron.—The local market continues quiet and steady. Most of the iron needed for the castings for the Pennsylvania Railroad tunnel has been covered, Lehigh Valley furnaces will get 54,000 tons and a Cleveland firm 27,000 tons. For northern iron we quote: No. 1X foundry, $14.50@15; No. 2X, $14; forge, $13@ $13.25. For Southern iron on dock prices are about as follows: No. 1 foundry, $13.50@ $13.75; No. 2 foundry, $13@13.25; No. 3 foundry, $12.75@$13; forge, $12.25@$12.50; No. 1 soft, $13.50@$13.75; No. 2 soft, $13@$13.25.

Bar Iron and Steel.—Demand is no better, but Eastern mills have reaffirmed prices. Refined bars are quoted at 1.455@1.495c., in large lots, with steel at the higher figures. Common iron bars can be had for $1.35c per pound.

Plate.—Demand shows little change and prices are nominally what they have been. Prices are on a basis of 1.745c. for ¼ in. carloads.

Steel Rails.—Quotations remain $28 for standard sections, f. o. b. mills. We quote light rails f. o. b. eastern Pennsylvania mills, as follows: 12-lb., $27; 20-lb., 25-lb., 30-lb., and 35-lb., $25; 40-lb. and 45-lb., $24.

Structural Material.—While there are signs of the labor disputes in the building trades being adjusted, there is little prospect of any immediate increase in orders for material. Large lots at tidewater are still at 1.75@2c. for beams, angles and channels.

Pittsburg. Aug. 30.

(*From Our Special Correspondent.*)

Conditions in the iron and steel markets during the last few days show a marked improvement, which is indicated by the starting of idle mills and furnaces. From the orders issued for resumption by constituent companies of the United States Steel Corporation it is evident that some large contracts in different lines of finished products have just been placed. All the idle departments in the big Homestead works of the Carnegie Steel Co. were put in operation last night and include the old 119-in. mill, which had been changed to roll plates 84 in. wide—the converting—the 33-in. and the 128-in. mills. While no official information is given out concerning the affairs of this company, it is understood that some large orders have been booked, and that there is enough business in sight to keep the works running steadily for some time. There is every evidence that since the big cut in prices the American Steel & Wire Co. has captured some important orders. Last week operations were resumed at the Schoenberger plant, including the two blast furnaces and steel works in this city. Yesterday orders were issued by the leading wire interest to put the big plant at Rankin in readiness for an early resumption, and the new nail plant at that place also will be ready for a start in a few days. The Carnegie Steel Co. has just blown in two blast furnaces at Bellaire and the steel plant at that place may be put in operation in a short time. An additional furnace of the Clairton group is to be blown in this week, and during the past week Furnace B of the Edgar Thomson group was put in blast. No. 3 furnace at New Castle, a new stack about completed, may be blown in before the end of the week. The only difficulty experienced by the Carnegie Co. is at its steel hoop plants in the Youngstown district, which were operated under Amalgamated Association rules last year, but have been started on a non-union basis. The association is making a fight against the policy adopted by the company, but it is not likely to succeed in preventing the operation of the mills. Today the Upper mill at Youngstown is in full operation, and the plant at Girard is in part operation, and new men are being sent there every day. The company issued a statement in which the fact was brought out that at the four hoop plants which the Amalgamated Association desires to control, 2,150 men are employed, and of these but 155 have been offered a reduction in wages, and the pay of 1,195 has not been disturbed. While the reduction of one man is 71% and the others range from 20 to 43%, the pay of the men reduced under the new schedule ranges from $3 to $15 a day. The Amalgamated Association also issued a statement in which they make the claim that by permitting the Carnegie Co. to make this new scale the wages of men employed in independent plants will be affected. The wage conference held in Chicago last week between representatives of the Amalgamated Association and the Republic Iron & Steel Co. ended on Saturday without an agreement. It was decided to call in the board of conciliation, which met in Chicago to-day with the workers' wage committee. It is believed, according to statements of the Amalgamated officials before leaving Pittsburg last night, that an agreement will be reached, as both sides have made concessions, and it is known that the Republic Co. has taken a considerable amount of new business lately. The National Tube Co. has succeeded in non-unionizing its Republic works on the South Side. This was the only plant of the company that operated under Amalgamated rules last year. The company has agreed to pay the Amalgamated scale, but will not recognize the union.

Considerable interest was taken here in a series of meetings of steel pools reported to have been held in New York during the past week. It was said that the pools would be dissolved, and an open market declared in all lines of finished products, but according to reports to-day, if any action was taken it was to strengthen the price agreements. Confidence seems to have been restored and active buying is now confidently expected. The pig iron market has been quiet during the past few days, sales being confined to small lots, but prices are firmer than a week ago, and it is not likely that they will decline. Business in sheets has improved somewhat and the American Sheet & Tin Plate Co. has put its Old Meadow plant at Scottdale in full operation after several months' idleness. Prices, however, continue low.

Pig Iron.—The total sales of all grades of pig iron during the week, so far announced, do not exceed 2,000 tons, but prices are firm. Bessemer is quoted at $12, Valley furnace; foundry No. 2 at $12.80@$13, Pittsburg, and gray forge at $12, Pittsburg.

Steel—Owing to uncertainty in the billet situation, consumers are waiting and no business of any consequence has been done for over a week. The pool price of $23 is still quoted for bessemer and open-hearth billets. Steel bars are quoted at 1.35c. and plates at 1.60c.

Sheets.—The demand seems to be improving but prices are low. While No. 28 gauge black sheets are quoted at 2.10c. it is reported that this price is being shaded from 5 to 10c. Galvanized sheets No. 28 gauge are quoted at 3.10@3.15c.

Ferro-Manganese.—No change is reported this week, the leading producer continuing to quote 80% domestic at $41.50 per ton.

Cartagena, Spain. Aug. 15.

(*Special Report of Barrington & Holt.*)

Iron and Manganiferous Ores.—Shipments for the week were one cargo, 4,000 tons manganiferous ore, to Great Britain. Ores are still selling at low prices, but current transactions are mainly for early deliveries. Freights are rather firmer, 6s. 3d. having been paid to Maryport.

Quotations for iron ore are: Ordinary 50% ore, 6s.@6s. 3d.; special low phosphorous, 6s. 6d.@7s. 3d.; specular ore, 58%, 8s. 6d.; magnetic ore, 60%, 10s. 9d. for lumps, 9s. for smalls. Manganiferous ores range from 9s. 3d. for 12% manganese and 35% iron, up to 14s. for 20% manganese and 20% iron. Dry ores show a reduction of about 3d. per ton.

Pyrites.—Iron pyrites, 40% iron and 43% sulphur, are quoted at 10s. per ton. Shipments for the week were 9,700 kg. copper-bearing pyrites to Marseilles. The total shipments of iron pyrites from Carthagena for the year 1903 were 12,281 tons, of which 4,066 tons went to the United States.

CHEMICALS AND MINERALS.

New York, Aug. 31.

Preparations are being made for the fall trade, and consumers are already making inquiries. Prices generally are firm, although the raw material markets are easier.

Among the exports from New York for the seven months ending July 31 were 258,946 bags acetate of lime, chiefly to Belgium; 1,464,137 lb. bicarb. soda, mostly to Argentine Republic; 1,507,723 lb. caustic soda, principally to Mexico and Cuba; and 42,996 bbl. zinc oxide, largely to Great Britain.

The consumption of foreign products in the United States in the seven months ending July 31, is reported below:

	Imports.	Exports.	Entered for Consumption
Asphalt, tons	62,543	1,437	61,106
Cement, lb.	217,248,928	10,523,810	206,725,118
Chlorate of potash, lb	79,061	3,664	75,397
Clay or earths, tons	121,198	142	121,056
Graphite, tons	7,760	4	7,756
Pyrites, tons	194,583	.....	194,583
Salt, lb.	199,766,268	952,774	198,813,494
Saltpeter, lb	7,860,415	789,650	7,070,765
Soda, caustic, lb.	1,509,856	771,012	738,844
Soda, nitrate, tons	165,606	3,229	162,377
Soda, sal., lb	2,962,028	9,008	2,953,020
Soda ash, lb	10,392,374	12,270	10,380,104

Exports of domestic products in the same period of this year and last were:

	1903.	1904.	Changes.
Cement, bbl.	132,316	265,813 I.	133,497
Copper sulphate, lb	16,997,897	24,594,316 I.	7,596,419
Gunpowder, lb	451,851	316,400 D.	135,451
Lime, bbl.	26,211	37,913 I.	11,702
Lime, acetate, lb.	35,173,850	37,620,830 I.	2,446,980
Phosphates, tons	430,198	503,587 I.	73,389
Salt, lb.	13,071,626	15,121,760 I.	2,050,134

Imports were chiefly from Germany and Great Britain; exports mostly to the West Indies, Central and South America.

The foreign trade of Great Britain in the seven months ending July 31 is shown below:

	Exports.	Imports.
Bleaching powder, lb.	51,199,680	15,136,800
Borax, lb.	.....	23,661,344
Brimstone, tons	.....	11,952
Cement, tons.	216,694	162,304
Chemical manures, tons	212,670	.....
Copper sulphate, tons	64,088	.....
Nitrate of soda, tons	.....	74,273
Phosphates, tons	.....	264,828
Pyrites, tons	455,594	.....
Salt, tons.	372,992	.....
Saltpeter, lb	.....	16,840,880
Soda, ash, lb.	84,043,008	
Soda, bicarb., lb.	19,514,768	
Soda, caustic, lb.	83,316,688	19,822,320
Soda, crystals, lb	12,268,928	
Soda, sulphate, lb.	58,448,992	
Soda, other sorts, lb.	21,154,896	
Sulphuric acid, lb.	8,507,512	.....

Imports generally show an increase; exports a decrease.

Cyanide.—Quiet at 18@19c. per lb., for large lots at New York.

Bleaching Powder.—Unsold stocks in store are small, initiating higher prices for prompt deliveries. Futures are in good supply, but makers are holding for an advance on 1905 business. Prime brands to arrive are quoted at $1.20@$1.25 per 100 pounds.

Copper Sulphate.—Uninterestingly quiet at $1.20@$1.25 per 100 pounds.

Acids.—In better request at hardening prices.

We quote as below per 100 lb., unless otherwise specified, for large lots in carboys or bulk (in tank cars), delivered in New York and vicinity:

Muriatic, 18°	$1.50	Oxalic, com'l	$5.00@$5.25
Muriatic, 20°	1.60	Sulphuric, 50°	
Muriatic, 22°	1.75	bulk, ton	13.50@14.50
Nitric, 36°	4.50	Sulphuric, 60°, 1.05	
Nitric, 38°	4.75	bulk, ton	18.00@20.00
Nitric, 40°	5.00	Sulphuric, 66°, 1.20	
Nitric, 42°	5.50	bulk, ton	21.00@23.00

Brimstone.—Shipments of best unmixed seconds, either foreign or domestic, are quoted at $21.50 per ton. The report that the Sicilian combination is about to make overtures to the Louisiana people for a division of territory is interesting. Considering that America imported 155,996 tons Sicilian sulphur last year, and that so far in 1904 these imports have fallen off about 18%, a trade agreement would not be surprising, though it might be inadvisable.

Exports of brimstone from Sicily in July amounted to 28,628 long tons, making a total of 332,543 tons for the seven months, which is 29,143 tons more than was reported in the corresponding period last year. The shipments to the United States in the seven months this year were 57,885 tons best unmixed seconds, and 15,474 tons best thirds, a total of 73,359 tons, as against 89,468 tons in 1903, showing a decrease of 16,109 tons, or about 18 per cent.

Stocks in Sicily on July 31 were 293,188 tons, which compare with 278,025 tons on June 30, and 304,255 tons on July 31, 1903.

Pyrite.—Business is seasonably good at 9@10c. per unit for fines, and 10@12c. for lump ore, according to sulphur content and purity. Spanish ore carries from 46@52% sulphur; American, from 42@44 per cent.

Nitrate of Soda.—Higher in all positions, primarily because of opening of European buying season. Arrivals recently have been large, but are quickly disposed of. Spot and futures, 95%, are quoted at $2.17½ per 100 lb., and 96% at $2.20. Freights are firmer. The *Tymeric* with 1,600 tons nitrate of soda and carrying also silver ore and sugar, has been lost in the Straits of Magellan. Production of nitrate of soda in the quarter ending July 31 totaled 518,000 tons, which is 13,000 tons more than was reported in the corresponding period last year.

Phosphates.—Inquiries are better, but new orders at advanced prices are few. Shipments on regular contracts are fairly large for this season. Ocean freights are steady, and tend upwards. There is talk of developing the phosphate deposit recently discovered on Mono island, in the Philippines. A company organized by Louisiana people intends to do the work, believing the deposit to be of great commercial value.

In Florida, Peace river shipments have more than doubled, amounting in July to 13,400 tons, making a total of 41,895 tons for the seven months, all domestic. In South Carolina, the coastwise shipments from Charleston, in July, were 7,332 tons, making 37,299 tons since January 1.

Phosphates are quoted as follows, per ton:

Phosphates.	F. o. b.	C. i. f. Gt. Britain or Europe.
*Fla., hard rock, 77@80%	$7.25@$7.50	$10.86@11.85
land pebble, 68@73%	3.75@ 4.00	7.70@ 8.40
†Tenn., 78@80%	4.00@ 4.25	10.27@10.67
78%	3.75@ 4.00	.....
75%	3.25@ 3.50	.....
‡So. Car. land rock	3.25@ 3.50	.....
river rock, 55@60%	3.00@ 3.25	6.33@ 6.56
Algerian, 63@70%	....	6.93@ 7.59
58@63%	....	6.15@ 6.60
53@58%	....	5.05@ 5.20
Tunis (Gafsa)	....	6.33@ 6.50
Christmas Isle, 80@85%	....	13.20@14.03
Ocean Isle, 82@88%	....	13.60@14.45
Somme, Fr., 70@75%	....	10.63@11.02
Bordeaux, Fr., 60@65%	....	7.60@ 7.72
55@60%	....	6.44@ 6.55
Liege, Bel., 60@65%	....	7.00@ 7.10

*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel, Ashley River S. C.

Ocean freights are as follows, per ton:

Destination	Florida.	So. Car.	Bone, Algeria.	Sfax, Tunis.
Baltic	$3.50@3.75	.....	....	$2.16
Continental	3.12@3.25	.....	$1.44	1.80@1.86
Mediter'nean	3.62	$2.88	2.04	2.28
U't'd King'm	3.00@3.25	2.64@2.76	....	1.80

Sulphate of Ammonia.—Comparatively little is being done. For gas liquor $2.975@$3 per 100 lb. is asked.

Liverpool. Aug. 23.

(*Special Report of Joseph P. Brunner & Co.*)

Quotations for heavy chemicals are firmly maintained all round, although the export trade is still far from active.

Soda ash in tierces is quoted as follows: Leblanc ash, 48%, £5@£5 10s.; 58%, £5 10s.@£6 per ton, net cash. Ammonia ash, 48%, £4 5s.@£4 10s.; 58%, £4 10s.@£4 15s. Bags, 5s. per ton less. Soda crystals are in good domestic request at £3 7s. 6d. per ton, less 5% for barrels, or 7s. less for bags, with special terms for a few favored markets. Caustic soda we quote: 60%, £8 15s.; 70%, £9 15s.; 74%, £10 5s.; 76%, £10 10s. per ton, net cash. Special quotations for the Continent and a few other export quarters.

Bleaching powder is quiet as regards new export business, but makers are well sold on forward contracts, and for hardwood £4 15s.@£5 per ton, net cash, is now generally quoted, as to destination.

Chlorate of potash is steady at 3@3.25d. per lb., net cash, as to quality and market.

Bicarbonate of soda is held for £6 15s. per ton, less 2.5% for the finest quality in 1 cwt. kegs, with usual allowances for larger packages, also special terms for a few favored markets.

Sulphate of ammonia is in rather better request and dearer at £12@£12 2s. 6d. per ton, less 2.5% for good gray 24@25% in double bags, f. o. b. here.

METAL MARKET.

New York, Aug. 31.

Gold and Silver Exports and Imports

At all United States Ports in July and Year.

Metal	July		Year	
	1903.	1904.	1903.	1904.
Gold.				
Exports	$9,117,758	$1,083,749	$40,453,999	$69,532,642
Imports	4,631,207	8,925,418	18,607,261	56,689,144
Excess	E. $4,486,551	I. $7,842,169	E. 21,846,738	E $12,843,498
Silver:				
Exports	3,015,426	4,534,514	20,520,765	30,902,213
Imports	2,564,217	1,381,017	12,545,511	15,156,617
Excess	E. $451,209	E. 3,153,497	E. $7,975,254	E $15,745,596

These exports and imports cover the totals at all United States ports. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, New York.

For the week ending August 27th and for years from January 1st.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports
Week	$508,000	$30,529	$651,935	$24,949
1904	70,303,579	3,765,966	26,372,012	630,912
1903	32,173,799	3,704,830	13,357,375	1,607,037
1902	24,513,808	1,569,012	16,77.,481	822,727

Nearly all the gold exported this week went to Montevideo, and the silver to London. Imports were principally from Central and South America, and the West Indies.

Business continues quiet generally, although there has been some recovery in the speculative markets, principally due to high prices for grain and cotton. The anticipated shipments of gold abroad have not yet taken place, although exchange continues at a high level.

The statement of the New York banks—including the 56 banks represented in the Clearing Houses—for the week ending August 27,

gives the following totals, comparisons being made with the corresponding week of 1903:

	1903.	1904.
Loans and discounts	$925,111,500	$1,099,057,200
Deposits	920,123,900	1,207,302,800
Circulation	43,918,400	37,724,400
Specie	174,997,900	277,578,900
Legal tenders	75,711,000	81 622,200
Total reserve	$250,708,900	$359,201,100
Legal requirements	230,030,975	301,825,700
Balance surplus	$20,677,925	$57,375,400

Changes for the week this year were an increase of $109,500 in circulation, and decrease of $117,200 in loans and discounts, $2,267,700 in deposits, $1,600,800 in specie, $203,800 in legal tenders, and $1,237,675 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars, and comparison is made with the holdings at the corresponding date last year:

	1903. Gold.	1903. Silver.	1904. Gold.	1904. Silver.
N. Y. Ass'n.	$174,997,900	.....	$277,578,900	.....
England	180,507,735	.....	182,598,205	.....
France	511,231,620	$224,297,555	537,859,215	$234,377,805
Germany	180,565,000	63,440,000	179,490,000	63,065,000
Spain	73,120,000	100,725,000	73,790,000	101,985,000
Netherlands	19,712,500	32,455,000	27,402,000	32,079,000
Belgium	14,703,335	7,351,665	15,543,335	7,771,665
Italy	95,980,000	11,494,000	110,540,000	19,788,500
Russia	406,235,000	43,880,000	468,105,000	43,125,000
Austria	227,140,000	64,195,000	241,325,000	62,715,000

The returns of the Associated Banks of New York are of date of Aug. 27 and the others Aug. 25, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The bank of England reports gold only.

The silver market has continued dull, in the absence of buying by the Indian government or demand from Indian bazaars.

The United States Office in New York reports 43,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to August 18 are reported by Messrs. Pixley & Abell's circular as follows:

	1903.	1904.	Changes
India	£3,736,475	6,831,088 I.	£3,094,613
China	279,111	372,722 I.	93,611
Straits	678,479	58,103 D.	620,376
Total	£4,694,065	£7,261,913 I.	£2,567,848

Receipts for the week this year were £165,000 in bar silver from New York, and £5,000 from Australia; total, £170,000. Shipments were £208,000 in bar silver to Calcutta, £42,000 to Bombay, £5,000 to Colombo, and £5,000 to Malta; total, £260,000.

Indian exchange has been somewhat easier. The demand for money in India continues, but has been partially met by shipments of gold from Australia. The Council bills offered in London were taken at an average of 15.97d. per rupee. Some shipments of silver have been made to India on Council orders, but private demand has fallen off, partly on account of re-sales of silver bought for Chinese account by the Eastern banks.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars	$0.45¾	$0.47¼
Peruvian soles and Chinese pesos	.41½	.43
Victoria sovereigns	4.86	4.87½
Twenty francs	3.88	3.92
Spanish 25 pesetas	4.78	4.82

OTHER METALS.

SILVER AND STERLING EXCHANGE.

August	Sterling Exchange.	Silver. New York. Cents.	Silver. London. Pence.	August	Sterling Exchange.	Silver. New York. Cents.	Silver. London. Pence.
25	4.87¼	57¼	26 5/16	29	4.8760	57¼	26¼
26	4.87¼	57	26¼	30	4.87¼	56¾	26 5/16
27	4.87¼	56¾	26 5/16	31	4.87¼	57	26¼

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver .925 fine.

Daily Prices of Metals in New York.

August.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. Cathodes, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. Per lb.	Spelter. St. Louis, Cts per lb..
25	12¾ @12¾	12¾ @12¾	12 @12¼	57¾	27¼	4.10	4.85	4.70
26	12¾ " 12¾	12¾ " 12¾	12 " 12¼	57¾	27¼	4.10	4.85	4.70
27	12¾ " 12¾	12¾ " 12¾	12 " 12¼	....	27¼	4.10	4.85	4.70
29	12¾ " 12¾	12¾ " 12¾	12 " 12¼	57¼	27	4.20	4.90	4.75
30	12¾ " 12¾	12¾ " 12¾	12 " 12¼	57¼	27	4.20	5.00	4.85
31	12¾ " 12¾	12¾ " 12¾	12 " 12¼	57¼	27¼ 27¾	4.20	5.00	4.85

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wire-bars.

Copper.—The market has ruled quiet but firm throughout the week, without any special feature, and nothing of interest has transpired. The quotations are unchanged at 12⅜@12⅝ for Lake; 12¼@12½ for electrolytic in ingots, cakes and wirebars; 12@12¼ for cathodes; 12@12¼ for casting copper.

The market for standard copper in London, which closed last week at £57 7s. 6d., opened on Monday at £57 5s., and the closing quotations are cabled on Wednesday as £57 5s.@£57 6s. 3d. for spot, £57 6s. 3d.@£57 7s. 6d. for three months.

Refined and manufactured sorts we quote: English tough, £59 15s.@£60; best selected, £60 15s.@£61; strong sheets£69 10s.@£70; India sheets, £67 10s.@£68; yellow metal, 6@6⅛d.

Exports of copper from New York and Baltimore for the week ending August 30 were 1,124 long tons, principally to Great Britain and Germany. Imports for the week of August 26 were 43 tons.

Imports of copper and copper material into the United States, with re-exports of foreign material, are reported by the Bureau of Statistics of the Department of Commerce and Labor as below, for the seven months ending July 31; the figures given are in long tons, of 2,240 lb.:

Fine Copper	1903.	1904.	Changes.
Imports	34,352	36,598 I.	2,246
Re-exports	934	234 D.	700
Net imports	33,418	36,364 I.	2,946
Ores and Matte:			
Imports	146,122	150,313 I.	4,191
Re-exports	4,061	..... D.	4,061
Net imports	142,061	150,313 I.	8,252

The copper contents of the ores imported this year are given by the report at 9,096 tons, making the total net imports this year equal to 45,460 tons of fine copper. Last year copper contents of ores and matte were not reported. The imports from Mexico this year were 25,817 tons copper and 35,122 tons ore and matte, containing 4,111 tons of metal; a total of 29,928 tons copper. Those from Canada and Newfoundland were 4,137 tons copper and 106,150 tons ore and matte, containing 4,110 tons metal; a total of 8,247 tons copper.

Exports of copper and copper material from the United States for the seven months ending July 31 are reported by the Bureau of Statistics as follows; the figures being in long tons:

	1903.	1904.	Changes.
Fine copper	72,278	133,322 I.	61,044
Ores and Matte	7,163	10,549 I.	3,386

The ores and matte are not separated in the report. Estimating their contents, chiefly on the basis of values, we find that the total exports this year were equal to 136,327 tons of fine copper. Deducting the net imports given above, we find that our exports this year have exceeded receipts by 90,867 long tons.

Tin.—The market has ruled very firm throughout the week, and the fluctuations have been within narrow limits. The closing quotations are given as 27@27¼ for spot and futures.

The foreign market, which closed last week at £123 5s., opened on Monday at £122 15s., declined on Tuesday to £122 12s. 6d., but reacted on Wednesday and the closing quotations are cabled as £123 15s.@£123 17s. 6d. for spot; £124 10s.@£124 12s. 6d. for three months.

Statistics for the month of August show a decrease in the visible supplies of 1,200 tons.

Imports of tin into the United States for the seven months ending July 31 are reported as follows, in long tons:

	1903.	1904.	Changes.
Straits	14,018	10,818 D.	3,200
Australia	152	201 I.	49
Great Britain	8,258	11,058 I.	2,800
Holland	642	397 D.	245
Other Europe	294	240 D.	54
Other Countries	33	20 D.	13
Totals	23,397	22,734 D.	663

The greater part of the tin imported through Great Britain is originally from the Straits Settlements.

Lead.—The feature of the week has been an advance in the prices quoted by the American Smelting & Refining Company of $2 a ton. Same took place on Monday. There has been a good consumptive demand. The closing quotations are given as 4.20 New York, 4.12½ St. Louis.

The foreign market is easy, Spanish lead being quoted at £11 12s. 6d.@£11 13s. 9d.; English lead, £11 15s.@£11 16s. 3d.

The foreign market remains strong, good ordinaries being quoted at £22 15s.@£22 16s. 3d.

Imports of lead in all forms into the United States, with re-exports of foreign lead, for the seven months ending July 31, are reported as below; the figures being in short tons, of 2,000 lb.:

	1903.	1904.	Changes.
Lead, metallic	360	6,050 I.	5,690
Lead in ores and base bullion	61,311	58,453 D.	2,858
Total imports	61,671	64,503 I.	2,832
Re-exports	47,401	51,258 I.	3,857
Net imports	14,270	13,245 D.	1,025

In addition to the re-exports given above, there were 116 tons of domestic lead exported in 1903, and 128 tons in 1904; an increase of 12 tons. Of the lead imported this year, 59,733 tons were from Mexico, and 4,000 tons from Canada.

St. Louis Lead Market.—The John Wahl Commission Company telegraphs us as follows: Lead is strong at the late advance, 4.12½c. being quoted for both desilverized lead and Missouri brands.

Spanish Lead Market.—Messrs. Barrington & Holt write from Cartagena, Spain, under date of August 15, that the price of silver has been 15 reales per oz. Exchange is 34.82 pesetas to £1. Local quotation for pig lead has been 66.50 reales per quintal, which, on current exchange, is equal to £10 13s. 2d. per long ton, f. o. b. Cartagena. Exports were 1,484,753 kg. argentiferous lead to London; 194,000 kg. desilverized lead and 1,134 kg. silver bars to Marseilles.

Spelter.—While last week the market was rather quiet, it became known on Monday that a large sale had been made for export, and prices advanced by leaps and bounds. It seems that the metal is needed very urgently, as business abroad is said to be very good, and the supplies rather limited. Inasmuch as consumers over here are rather poorly supplied, a further advance is looked for in well informed quarters. The closing quotations are given as 4.85 St. Louis, 5c. New York.

Exports of spelter from the United States for the seven months ending July 31 were 1,140 short tons in 1903, and 1,916 tons in 1904; an increase of 776 tons. Exports of zinc ore were 23,625 long tons in 1903, and 15,720 tons in 1904; a decrease of 7,905 tons this year.

St. Louis Spelter Market.—The John Wahl Commission Company telegraphs us as follows: Spelter is unsettled and slightly higher. The nominal price is about 4.90c., but some holders are asking more.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt write from Cartagena, Spain, under date of August 15, that the demand for zinc ores continues good. Prices are steady at 67 pesetas per ton for blende, 35% zinc, and 47 pesetas for calamine, 30% zinc.

Antimony is dull and neglected. We quote Cookson's at 67⅛@7c.; Hallett's, 6½@6⅝c.; U. S., French, Hungarian, Japanese, Italian and Chinese, 6@6⅛c.

Imports of antimony into the United States for the seven months ending July 31 are reported as follows, in pounds:

	1903.	1904.	Changes.
Metal and regulus.	3,757,779	2,260,779 D	1,497,000
Antimony ore	2,010,438	1,501,043 D.	509,395

This shows a decrease of 39.8% in metal, and of 25.4% in ore imported.

Nickel.—The price is quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per pound.

Exports of nickel, nickel oxide and nickel matter from the United States for the seven months ending July 31 were 1,496,738 lb. in 1903, and 2,880,665 lb. in 1904; showing an increase of 1,383,927 lb. this year. Imports of nickel ore and matte were 946 tons in 1903, and 5,311 tons in 1904; an increase of 4,365 tons.

Platinum.—Quotations are nominally $18.50 per ounce, but the tendency is upward, and higher prices are expected.

Platinum in manufactured forms is very firm. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 75c. per gram; foil and wire, 77c.; crucibles and dishes, 80c.; perforated ware, like cones, etc., 85c. per gram.

Imports of platinum into the United States for the seven months ending July 31 were 4,957 lb. in 1903, and 4,360 lb. in 1904; showing a decrease of 597 lb. this year.

Quicksilver.—Prices are unchanged. In New York large lots have been offered at $43.50 per flask, with $44.50 quoted for smaller orders. The San Francisco price continues $43@$44 for domestic business, but as low as $41.50@$42 has been offered for export. The London price is £7 17s. 6d., with the same quotation from second hands.

Exports of quicksilver from the United States for the seven months ending July 31 were 759,672 lb. in 1903, and 1,053,859 lb. in 1904; an increase of 294,186 lb. this year.

Minor Metals and Alloys.—Thallium is quoted at 60@65 marks per kg. at Breslau, Germany. Manganese metal is quoted 360 marks per 100 kg., f. o. b. Bremen, Germany. Manganese tin alloy, 55%, is quoted 365 marks per 100 kg. for first quality and 225 marks for second quality, both f. o. b. Bremen.

For other minor metals and their alloys, wholesale prices, f. o. b. works, are as follows:

Aluminum.	Per lb.		Per lb.
No. 1.99% ingots	.33@37c.	Ferro-chrom. (74%)	.12½c.
No. 2.90% ingots	.31@34c.	Ferro-Tungsten (37%)	.45c.
Rolled Sheets	.4c. up	Magn'um, pure (N.Y.)	.60c.
Alum-bronze	.20@23c.	Manganese	$2.75
Nickel-alum	.38@39c	Mangan'e Cp. (20%Mn)	32c.
Bismuth	$2.10	M'ng'n'e Cp. (30% Mn)	.38c.
Chr'm'm, pure (N. Y.)	.80c.	Molybdenum (Best)	$1.70
Copper, red oxide	.50c.	Phosphorus, foreign	.45c.
Fe.-Molybd'm (50%)	$1.00	Phosphorus, American	.70c.
Ferro-Titanium (10%)	.90c.	Sodium metal	.50c.
Ferro-Titanium (20@25%) N. Y.	.55c.	Tungsten (Best)	$1.25

Differences in price depend chiefly upon size and conditions of order.

Missouri Ore Market. Aug. 27,

(From Our Special Correspondent.)

The highest price reported paid for zinc ore during the week was $40 per ton for bins of choice ore. The assay basis price seems to continue strong at $35 to $38 per ton of 60% zinc, the demand still taking up the stock as fast as outputted on this basis. An upward jump of 10c. in the St. Louis spelter market at the close of this week offers some prospect that the metal will yet respond to the exigencies of the occasion.

Following are the shipments of zinc and lead from the various camps of the Joplin district for the week ending August 27:

	Zinc lb.	Lead lb.	Value.
Joplin	2,886,060	364,150	$62,860
Webb City-Carterv'l	2,685,980	472,580	57,940
Duenweg	684,810	204,400	17,220
Galena-Empire	785,060	108,800	15,790
Alba-Neck	689,490	11,450	13,400
Aurora	679,500	11,440	10,950
Granby	762,000	85,000	10,190
Carthage	299,130	.....	5,680
Prosperity	131,870	48,470	3,760
Badger	182,840	6,960	3,510
Oronogo	190,430	11,970	3,300
Sherwood-Mitchell	128,270	21,310	3,110
Beef Branch	24,720	49,820	800
Diamond	65,250	.....	680
Spurgeon-Spring C.	28,460	18,450	500
Totals	10,233,870	1,414,800	$209,690
8 months	345,145,670	43,769,160	$6,917,605

Zinc value, the week, $174,960; 35 weeks, $5,724,185.
Lead value, the week, 34,730; 35 weeks, 1,193,420

The shipment for the eight months of this year, ending with this week, aggregates 172,573 short tons of zinc ore and 21,885 short tons of lead ore, which sold for $6,917,600, an average of $864,700 per month, or $197,645 per week. Zinc has averaged $33.20 per ton this year, against $35 during the same period of last year, and lead has averaged $54.53, against $54 last year. The lead average is higher, but the zinc average is less. This was occasioned by the lower prices the fore part of the year and the downward break in June. With an increase of 7,200 tons in the zinc shipment and 2,470 tons in the lead shipment of this year's values only exceed the lesser shipment of last year $183,480.

LATE NEWS.

UTAH.

BOX ELDER COUNTY.

(From Our Special Correspondent.)

Century.—This mine, in Park valley, maintains its regular gold output, and is paying $3,000 in dividends monthly.

Utah Oil and Liquid Asphalt Co.—This company at Ogden, owning oil and asphalt lands on the promontory of the Great Salt lake, has connected a steam boiler with a steam coil at the bottom of one of its wells. The steam liquifies the oil-asphaltum so that a flow of from 400 to 500 gal. a day is obtained. An analysis of the product shows 54% asphaltum, and 43% good illuminating and lubricating oil. The company will soon begin the production on a commercial basis.

JUAB COUNTY.

(From Our Special Correspondent.)

Mammoth.—A representative of the Liberty Bell Gold Mining Co., of Telluride, Colo., is making an effort to secure the tailings dump at this mine, at Mammoth, estimated to contain 350,000 tons of a metallic value of $2,000,000. The company is shipping the gold ore recently uncovered in the lower workings of this property.

SALT LAKE COUNTY.

(From Our Special Correspondent.)

Little Pittsburg.—A fine body of high-grade galena ore has been opened in this Alta property. This is the second find of importance during the past few days. J. E. Hill, Jr., is manager.

Ohio and Fortuna.—It is rumored that a deal is pending towards a consolidation of the holdings of the Ohio Copper Co. with those of the Fortuna Co., at Bingham. The Congo mine may be included.

Utah Consolidated.—The furnaces of this company, in Salt Lake valley, are sending out 50,000 lb. of copper bullion daily. The product carries good values in gold and silver. The estimated gross yearly earnings of the company, on this basis of production, is placed at $2,000,000.

Utah Copper Co.—This company's Bingham mill will handle about 750 tons daily of crude ore early in September, as against the usual 350 tons at present. It is stated that the company is figuring on increasing the capacity of its plant, next year, to 2,000 tons.

Yampa.—Plans have been approved for the second furnace for the smelter on this mine at Bingham and are in the hands of the manufacturer.

Average Prices of Metals per lb., New York.

Mo.	Tin.		Lead.		Spelter.	
	1903.	1904.	1903.	1904.	1903.	1904.
Jan.	28.33	28.845	4.075	4.347	4.865	4.863
Feb.	29.43	28.087	4.075	4.375	5.043	4.916
Mar.	30.15	28.317	4.442	4.475	5.349	5.057
April.	29.81	28.132	4.567	4.475	5.550	5.219
May.	29.51	27.718	4.325	4.423	5.639	5.031
June.	28.34	26.325	4.210	4.196	5.697	4.760
July.	27.68	26.573	4.075	4.192	5.662	4.873
Aug.	28.29	27,012	4.075	4,111	5.725	4,866
Sept.	26.77	.....	4.243	.....	5.686	.....
Oct.	25.92	.....	4.375	.....	5.510	.....
Nov.	25.42	.....	4.218	.....	5.038	.....
Dec.	27.41	.....	4.162	.....	4.731	.....
Year	28.09	.....	4.237	.....	5.400	.....

NOTE.—The average price of spelter in St. Louis for the month of January, 1904, was 4.673c. per lb.; February, 4.717c.; March, 4.841c.; April, 5.038c.; May, 4.853c.; June 4.596c.; July, 4.723c.; August, 4.716c.

Average Prices of Copper.

Mo.	New York.				London.	
	Electrolytic.		Lake.		Standard.	
	1903.	1904.	1903.	1904.	1903.	1904.
Jan.	12.159	12.410	12.361	12.553	53.52	57.55
Feb.	12.778	12.063	12.901	12.245	57.34	56.57
Mar.	14.416	12.299	14.572	12.551	63.85	57.321
April.	14.454	12.923	14.642	13.120	61.72	58.247
May.	14.435	12.758	14.618	13.000	61.73	57.321
June.	13.942	12.269	14.212	12.399	57.30	56.398
July.	13.094	12.380	13.341	12.505	56.64	57.256
Aug.	12.962	12,343	13.159	12,468	58.44	56,952
Sept.	13.205	.....	13.345	.....	56.82	.....
Oct.	12.801	.....	12.954	.....	55.60	.....
Nov.	12.617	.....	12.813	.....	56.30	.....
Dec.	11.952	.....	12.084	.....	56.36	.....
Year	13.235	.....	13.417	.....	57.97	.....

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Mo.	1902.		1903.		1904.	
	London, Pence.	N. Y., Cents.	London, Pence.	N. Y., Cents	London, Pence.	N. Y., Cents.
Jan.	25.62	55.56	21.98	47.57	26.423	57.055
Feb.	25.41	55.09	22.11	47.89	26.665	57.592
Mar.	25.00	54.23	22.49	48.72	26.164	56.741
April.	24.34	52.72	23.38	50.56	24.974	54.202
May.	23.71	51.31	24.89	54.11	25.578	55.430
June.	24.17	52.36	24.29	52.86	25.644	55.673
July.	24.38	52.88	24.86	53.92	26.760	58.095
Aug.	24.23	52.52	25.63	55.36	26,591	57,806
Sept.	23.88	51.52	26.75	58.00	.....	.....
Oct.	23.40	50.57	27.89	60.36	.....	.....
Nov.	22.70	49.07	27.01	58.11	.....	.....
Dec.	22.21	48.03	25.73	55.375	.....	.....
Year	24.09	52.16	24.75	53.57	.....	.....

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

DIVIDENDS.

Company.	—Latest Dividend.— Payable.	Rate.	Total.	Total to date.
*Annie Laurie, Utah.	Sept. 10	.50	$12,500	$400,000
†Ala. Con., Coal & I.p	Sept. 1	1.75	43,117	819,031
*Claremont Oil, Cal. f.	Aug. 20	.01	5,000	15,000
†Federal Sm., com.	Sept. 15	1.50	78,750	157,500
†Federal Sm., pf.	Sept. 15	1.75	183,750	735,000
†Gen'l Chem., pf.	Oct. 1	1.50	150,000	3,175,178
*Imperial Oil, Cal.	Sept. 6	.20	20,000	700,000
*Monte Cristo Oil, Cal	Sept. 10	.01	5,000	70,000
†Nat'l Lead, pf.	Sept. 15	1.75	260,820	14,754,628
*Oil City Petro., Cal.	Sept. 1	.00½	2,500	15,000
*Pacific Coast Borax.	Aug. 30	1.00	19,000	1,858,500
*Peerless Oil, Cal.	Sept. 1	.14	12,880	306,740
*Thirty-three Oil, Cal.	Sept. 6	.10	10,000	330,000

*Monthly. †Quarterly.

ASSESSMENTS.

Company.	Delinquent.	Sale.	Amount.
Allouez, Mich	Sept. 26	.....	$1.50
Belcher, Nev.	Sept. 13	Oct. 4	.10
Caledonia, Nev.	Aug. 31	Sept. 21	.15
Confidence, Nev	Sept. 19	Oct. 7	.20
Con. New York, Nev	Sept. 13	Oct. 4	.05
Kentuck, Nev.	Sept. 8	Sept. 29	.05
Last Chance, Cal	Sept. 16	.....	.002½
Maple, Utah	Sept. 6	Sept. 22	.00½
Marina Marsicano, Cal.	Sept. 20	Oct. 31	.05
May Day, Utah	Aug. 31	Sept. 24	.01½
Mexican, Nev.	Sept. 12	Oct. 3	.15
Mohican, Cal.	Oct. 15	.....	.10
Orleans Con., Cal.	Sept. 15	Oct. 31	.07½
Overman, Nev	Aug. 23	Sept. 12	.10
Seg. Belcher & Mides, Nev	Aug. 30	Sept. 19	.05
Sierra Nevada.	Sept. 1	Sept. 21	.10
Utah Con., Nev	Sept. 10	Oct. 3	.05
Yellow Jacket, Nev.	Sept. 17	.....	.10

STOCK QUOTATIONS

NEW YORK.

Company.	Par val.	Aug. 24 H.	Aug. 24 L.	Aug. 25 H.	Aug. 25 L.	Aug. 26 H.	Aug. 26 L.	Aug. 27 H.	Aug. 27 L.	Aug. 29 H.	Aug. 29 L.	Aug. 30 H.	Aug. 30 L.	Sales.
Alta	$1					.12								500
Amalgamated	100	57½	55¾	57½	56½	57½	56¾	57½	56¾	58¼	57¾	58	57	176,365
Anaconda	25	79½	79½	.80	.79	80½	79½			80	79½			3,080
Andes	1													
Belcher	3			.24										700
Best & Belcher	3													
Brunswick	1													
Caledonia	1	.67				.60	.58							400
Challenge	2½													
Chollar	2½													
Confidence	1													
Con.Cal.& Va.	3	1.10	1.05			1.15				1.05				855
Con. Imperial	2½			.03								.02½		1,000
Cripple CreekCon	1					.10				.10		.10		2,000
Crown Point	1													
Elkton	1	.65										.65		500
Gold Dollar	1	.06	.05	.06	.05	.06						.06		4,500
Gould & Curry	1	.20				.25								300
Greene Con.	10	14¼	14	14¼		14	13½	14¼	14	14¼	14¼	14¼	14½	7,030
Hale & Norcross	3	.63										.62		400
Homestake	100													
Iron Silver,	20													
Isabella	1									.20				500
Justice,	2			.11	.10									400
Leadville												.02		500
Little Chief	50			.06										200
Mexican	2					.85				.90		.90	.88	650
Mollie Gibson	5					.04								500
Moon Anchor	3	.07												1,500
Moulton,	25					.15				.15				200
Occidental	3					.82								400
Ophir	5													
Pharmacist	1													
Phoenix	1	.18		.17	.15	.15	.14					.15		1,800
Portland	1													
Potosi	1	.17				.14								500
Savage	3											.21	20	400
Sierra Nevada	3			.22										300
Silver Hill,	1			.56						.58				500
Standard Con.	10													
Tennessee	25			28½						29¾	29½			250
Union Con	1			.40	.39					.43	.42			600
Union Copper	10	⅛						⅛		1	1⅛	1⅛	⅛	3,000
United Cp. Com.	100											8		200
Utah	1													
Vindicator	1													
White Knob	10	4				4	3¾	4	3¾					720
Work,	1			.10						.10	.09			900
Yellow Jacket	1	.24												300

Total sales, 212,650 shares.

COAL, IRON AND INDUSTRIAL STOCKS.

Company.	Par val.	Aug. 24 H.	Aug. 24 L.	Aug. 25 H.	Aug. 25 L.	Aug. 26 H.	Aug. 26 L.	Aug. 27 H.	Aug. 27 L.	Aug. 29 H.	Aug. 29 L.	Aug. 30 H.	Aug. 30 L.	Sales.
Allis-Chalmers	$100													
Preferred	100					50	49½							74
Am. Agr. Chem.	100													
Preferred	100													
Am. Sm. & Ref.	100	64½	63½	64½	63½	64	63½	63¾	63½	64	63¾	63¾	63½	14,645
Preferred	100	107½	106¾	107½	107	107	106½	107		107				2,353
Col. Fuel & I	100	36½	36	36½		37½	36¾	36¾	36¾	37½	36½	37½	36½	5,570
Preferred	100													
Col. & H. C. & I.	100	12	11¾	12½	12	12		12½	12½	12½	12½	13	12½	2,500
Crucible Steel	100	5½		5½		5½		5½		5½	5½			465
Preferred	100	38	37			37½	37			37½		37½		98
General Chemical	100													
Preferred	100			95		95	94½							500
Mong. R. Coal	50	8		8										200
Preferred	50													
National Lead	100	24	23½	24	23¾	23¾	22¾	23	22½	23½	23¼	23½	23	9,300
Preferred	100			96						96½		96		500
Phila. Nat. Gas	100	40												100
Preferred	100													
Pittsburg Coal	100									12½		13		10
Preferred	100	58	57½	57¾	57½					57¾	57			651
Republic I. & S.	100	7¾		7¾	7½	7¾	7¾	7½		7¾	7½	7¾	7½	4,880
Preferred	100	42		42½	42	44	43½	43½		43¾	43½	44	43½	3,040
Sloss-Shef.S & I.	100	37		37										300
Preferred	100									86				100
†Standard Oil	100	627		627	625	625								56
Tenn.C.I.&R.R.	100	44½	44½	45	44¾	45½	44½	44½		45¾	44¾	45	44½	9,140
U.S.Steel Corp	100	12½	11¾	12	11½	12½	12	12½	12	12½	12¾	12¾	12¾	52,510
Preferred	100	59¾	58½	59¾	58½	60¾	59¾	60	59¾	60¾	59½	61½	60½	233,275
Va.-Car Chem	100	32		32¾	32½	32		31½		32½	31½	32½	32½	4,390
Preferred	100	104½	104½	106	105	105½	105½	105¾	105½	107½	105½	107¾	106	4,029

*Pittsburg Exchange; all others, New York Stock Exchange

Total Sales, 348,686 shares.

SAN FRANCISCO.*

Company.	Location.	Aug. 18 H.	Aug. 18 L.	Aug. 19 H.	Aug. 19 L.	Aug. 20 H.	Aug. 20 L.	Aug. 22 H.	Aug. 22 L.	Aug. 23 H.	Aug. 23 L.	Aug. 24 H.	Aug. 24 L.	Sales.
Golden Anchor	Nev.													
MacNamara	Nev.	.39	.37	.41	.39	.43	.40	.45	.43	.44	.40	.41	.40	19,100
Mont. Tonopah	Nev.	2.40	2.35	237½	2.35			2.45	2.30	237½	2.30	2.30	227½	4,600
Ton. Belmont	Nev.	.64	.62	.63	.62	.64	.63			.61		.60		3,500
Ton. Midway	Nev.	.44	.43	.44		.44		.43	.42			.43		6,600
Ton. Mg. Co	Nev.													50
Ton. North Star	Nev.			.25	.24			.26						1,900

*San Francisco & Tonopah Exchange. Total Sales, 35,750 shares.

SAN FRANCISCO (By Telegraph.)

Company	August 29	August 30	Company	August 29	August 30
Belcher	$0.23	$0.24	Gould & Curry	$0.24	$0.26
Best & Belcher	1.20	1.35	Hale & Norcross	.60	.61
Caledonia	.64	.64	Mexican	.90	.91
Challenge Con.	.21	.21	Ophir	2.50	2.50
Chollar	.16	.15	Overman	.21	.21
Confidence	.66	.65	Sierra Nevada	.33	.33
Con. California & Virginia	1.15	1.15	Union Con	.39	.40
Crown Point	.17	.17	Yellow Jacket	20	.20

BOSTON, MASS.

Company.	Par val.	Aug. 24 H.	Aug. 24 L.	Aug. 25 H.	Aug. 25 L.	Aug. 26 H.	Aug. 26 L.	Aug. 27 H.	Aug. 27 L.	Aug. 29 H.	Aug. 29 L.	Aug. 30 H.	Aug. 30 L.	Sales.
Adventure Con.	$25	1	.90	1		1		1¼	1	2	1½	2	1½	3,095
Allouez	25	12½	11¼	14½	12½	15	15	14½	14	14½	13½	14½	13½	13,899
Amalgamated	100	57½	55½	57½	56½	57½	56½	57½	56½	58½	57½	58	57½	16,802
American Zinc	25									12½		13		135
Anaconda	25	19½								20½		20		180
Arcadian	25	87½		87½		1.00	87½	.85		97	90			3,027
Arnold	25													
Atlantic	25	13½		12½	12½	13	11½	12½	12	15	13	14½	13½	5,676
Bingham Con.	50	25½	25	26½	25½	26½	25½	26½	26	27½	26	27½	27	7,678
Bonanza	10					50	48							200
Boston Con.	5			6½	6½	6½	6½	6½		6½	6½	7½	6½	8,295
Calumet & Hecla	25	500		520	500	515				515	510	520		48
Centennial	25	25½	24	26	25½	26½	25½	26½	26	28½	26½	28½	27½	15,040
Central Oil	25	7½												10
Con. Mercur	5									33	32	30		1,300
Cont. Zinc	25													
Copper Range	100	55½	54½	55½	54½	55½	54½	56½	55	57½	56½	57½	56½	11,174
Daly-West	20					13¾	13½	13½	13½	14		14	13½	496
Dominion Coal	100	51		51½	51	52	51½							425
Preferred	100			108½										15
Dominion I.& S	100	11½	11½	11						11½				150
Elm River	12					2½				2½	2½			1,095
Franklin	25	8		8		8		8½	8½	9¼	8½	9¼	9½	1,277
Granby Con.	10	3		3		3		3 1/16	3	3⅛	3 3/16	3⅛	3⅛	14,737
Guanajuato Con.	5			1½				1½						300
Isle Royal Con	25	15½	15	15½	15	14½	14½	16½	14½	19½	16½	20½	18½	19,553
Mass Con	25	3½				3½						3½	3½	160
Mayflower	25													
Michigan	25	4½	4½	4½	4½					5½	4½	5½	5½	1,757
Mohawk	25	43½	42½	43½	42½	43	42½	44	42½	46½	45	46	45½	5,222
Mont. Coal & C.	25	5	4	4½		4½	4½	4½	4½	5½	4½	6½	5½	10,960
Mont. & Boston	5			1										100
New Idria, Q'sil	5													
Old Colony	25			.95		.95	.90							395
Old Dominion	25	13				13½	13			14		16	14½	4,180
Osceola	25	67	64½	67	66½	67½	66½	71½	66½	73	71½	72½	71½	4,443
Parrot	10	24½		24½	24	25½	24½	25½	25½	25½	25½	26	25	2,110
Phoenix Con.	25	.75		.75		.75	.50			80		80	70	1,080
Quincy	25	84	83	86	84	85		87	84	88½	88	88	87½	489
Rhode Island	25									80		85		125
Santa Fe	10			1½	1½	2	1½	2	1½	2	1½	1½	1½	5,096
Shannon	10	4	3½	3½	3½	3½	3½	3½	3½	4	3½	4½	3½	10,085
Tamarack	25	105	97	104	103	102	100	102	100	107	103	108	107	850
Trinity	25	8	7½	7½	7½	7½	7½	7½		7½	7½	7½		2,282
Union	25			2½								2½	2½	310
United States	10	22	21½	21½	21½	21½	21½	21½	21½	22½	21½	22½	21½	10,120
U.S.Coal & Oil	25	10		10½	10½	11	10½	11½	10½	12	11	12½	12	2,526
Utah Con	5	39¾	39½	40½	39¾	41¾	40	42¼	41½	43½	42½	42¾	42	38,018
Victoria	25	3	2½	3½	3	3½	3½	3½		3¾	3½	3½	3½	1,805
Winona	25	9⅜	8½	10	9½	10½	9½	10	9½	10½	10½	10½	10	13,893
Wolverine	25	81				84½	82	86	85	88	87½	88	87	238
Wyandot	25			65		75				1.00	90	112½		1,305

Total sales, 81,900 shares.

COLORADO SPRINGS, COLO.

Company.	Par val.	Aug. 20 H.	Aug. 20 L.	Aug. 22 H.	Aug. 22 L.	Aug. 23 H.	Aug. 23 L.	Aug. 24 H.	Aug. 24 L.	Aug. 25 H.	Aug. 25 L.	Aug. 26 H	Aug. 26 L.	Sales.
Acacia	$1	.06½	.05½	.06½	.05½	.06½	.05½	.06½	.05½	.06½	.06	.06½	.05½	1,000
Anaconda	5	.11		.11¼	.11	.11¼	.11¼	.11½	.11	.11½	.11	.11½	.11	2,000
Colo. City & M.	1	.01¼	.007	.007		.007		.007		.01¼		.007		
C. K. & N.	1	.40	.35½	.40	.35	.37½	.35½	.37	.36	.36½	.35½	.37	.34½	4,000
Cripple Ck. Con	1	.08¼	.08¼	.08¼	.08¼	.09	.08¼	.09	.08½	.09¼	.08½	.09½	.09	5,000
Des Moines	1	.02	.01½	.02	.01½	.02	.01½	.02	.01½	.02	.01½	.02	.01½	
Doctor-Jack Pot	1	.04¼	.04	.04¼	.04	.04¼	.04	.04¼	.04	.04¼	.04	.04¼	.04	2,000
Elkton Con.	1	.67	.65	.64	.64	.64½	.64	.65	.64½	.65	.64½	.65½	.64½	6,100
†El Paso	1	1.00	.94½	.94½	.93½	.94	.93½	.94½	.93½	.95	.94½	.94½	.94½	14,061
Gold Dollar Con.	1	.05½	.05½	.06	.05½	.06½	.06½	.06½	.06½	.06½	.06½	.06½	.06½	41,000
Gold Sovereign	1	.05½	.05½	.05½	.05½	.05½	.05½	.05½	.05½	.05½	.05½	.05½	.05½	4,000
Golden Cycle	1	.45	.40	.45	.40	.45	.40	.45	.40	.45	.40	.45	.40	
Hart	1	.04	.02	.04	.02	.04	.02	.04	.02	.04	.02	.04	.02	
Isabella	1	.20½	.19½	.20½	.19	.20½	.19½	.21	.20½	.20½	.20½	.21	.19½	2,000
Jack Pot	1	.05	.03	.05	.03	.05	.03	.05	.03	.05	.03	.04½	.03	
Keystone	1	.04½	.04½	.04½	.04½	.04½	.04½	.04½	.04½	.04½	.04½	.04½	.04½	1,000
Last Dollar	1	.40		.40		.40		.50		.40		.40		
Lexington	1	.03½	.03½	.03½	.03½	.03½	.03½	.03½	.03½	.03½	.03½	.03½	.03½	2,000
Little Puck	1	.03½	.03½	.03½	.03½	.03½	.03½	.03½	.03½	.03½	.03½	.03½	.03½	1,000
Mollie Gibson	1	.04		.04½	.04	.04½	.04	.04½	.04	.04½	.04	.04½	.04½	1,000
Moon-Anchor	1	.08½	.06½	.07½	.06½	.06½		.07½	.06½	.08	.06½	.08	.06½	
New Haven	1	.03½	.02½	.03½	.02½	.03½	.03½	.03½	.02½	.03½	.02½	.03½	.03	5,000
Old Gold	1	.11½	.11	.11½	.11½	.11½	.11½	.11½	.11½	.11½	.10½	.11½	11	4,000
Pharmacist	1	.03½	.03½	.03½	.03½	.03½	.03½	.03½	.03½	.03½	.03½	.03½	.03½	
Portland	1	1.65	1.60	1.70	1.60	1.65	1.60	1.65	1.60	1.65	1.60	162½	1.55	2,500
Vindicator Con.	1	.70	.67½	.70	.65	.69		.69		.69	.60	.69	.61	500
Work	1	.08½	.08½	.08½	.08½	.09	.08½	.09	.08½	.08½	.08½	.09	.08½	3,000

†Ex. Dividend. Total sales, 101,161 shares.

COLORADO SPRINGS (By Telegraph).

Company.	Aug. 29. H.	Aug. 29. L.	Aug 30 H.	Aug 30 L.	Company.	Aug. 29. H.	Aug. 29. L.	Aug. 30. H.	Aug. 30. L.
Anaconda	.11½	.11½	.11½	.11	Jack Pot	.05	.03	.04½	.03½
Cripple Ck. Con	.09½	.09½	.09½	.09½	Last Dollar	.40			
C. K. & N	.37	.35	.36	.33	Mollie Gibson	.04½	.04½	.02½	.02½
Doctor Jack Pot	.04½	.04	.04½	.04	Moon Anchor	.07½	.06½	.08	.07½
Elkton Con	.64½	.64½	.65½	.65	Old Gold	.11	.10½	.10½	.09½
El Paso	.95½		.94½	.91½	Pharmacist	.03½	.03½	.03½	.03½
Gold Dollar	.06½	.06½			Portland	1.65	1.60	1.70	1.60
Gold Sovereign	.05½	.05½	.05½	.05½	Vindicator Con.	.69	.61	.69	.61½
Isabella	.21		.21½	.21	Work	.09½	.08½	.09½	.09

PHILADELPHIA, PA.

Company.	Par val.	Aug. 24 H.	Aug. 24 L.	Aug. 25 H.	Aug. 25 L.	Aug. 26 H.	Aug. 26 L.	Aug. 27 H.	Aug. 27 L.	Aug. 29 H.	Aug. 29 L.	Aug. 30 H.	Aug. 30 L.	Sales.
Cambria Iron	$50			47½		47½								93
Cambria Steel	50			19½	19½	19½	19½	19½		19½		19½	19½	565
Int.Smokel'sPwd	100													
Preferred	100													
Lehigh C. & N.	50	80½	79½			80		81	80½	81½	81½	82	81½	1,146
Mont. Tonopah	1					2.35								
Philadelphia	50	40½	39½	40		39½	39½	39½		40	39½	39½		2,218
Preferred	50					44½				44½				145
Tonopah	100	8.06	8.00	8.00	7.87									
Tonopah-Belm't	1													
United Gas	50	89½	89	89½	89½	89½	89½	89½	89½	90½	89½	90½	90	4,696
Westmoreland C	50					78								3

Total sales, 8,866 shares.

STOCK QUOTATIONS.

ST. LOUIS, MO.* Aug. 27

Company	Par Val	Bid	Ask.	Company	Par Val	Bid	Ask.
Am.-Nettie, Colo	$10	$0.15	$0.25	Columbia Lead, Mo	$10	$0.25	$2.00
Catherine Lead, Mo.	10	1.00	2 00	Con. Coal, Ill.	100	14.00	15.50
Central Coal & C.	100	62.50	64.00	Doe Run Lead, Mo	100	110.00	115.00
Central C. & C., Pf.	100	72.00	74.00	Granite, Bimet Mt.	10	.40	.47
Central Lead, Mo.	100	110.00	117.00	St. Joe Lead, Mo	10	14.00	14.75

*By our Special Correspondent.

SALT LAKE CITY.* Aug. 27

Company	Par Val	High	Low	Sales	Company	Par Val	High	Low	Sales
Butler Liberal	$	$ .10½	$ .10	5,000	Silver Shield	.20	.01½	.01½	2,000
Carisa	$ 1	.08	.08	500	Star Con.	$1	.14½	.14	3,450
Con. Mercur	1	.32½	.30	1,400	Tetro	1	.30	.29	2,200
Columbus Con.		1.16	1.02½	2,650	Uncle Sam, Con	1	.21	.21	750
Daly Judge	1	4.50	4.50	50	Yankee Con	1	.34½	.34½	600
Daly West	20	13.87½	13.00	1,025					
May Day	.25	.01½	.01½	25,400					
N.Y.Bonanza	1	.05½	.04½	9,200					
Golden Eagle		.02½	.02½	1,000					
Goldfield Bon		.05	.05	2,000					
Petro	5	.06½	.06½	5,100					
Sacramento	5	.10½	.11½	11,000					

*By our Special Correspondent. Total sales 83,325 shares.

DULUTH, MINN. Aug. 6

Company	Par Val	Bid	Ask	Company	Par Val	Bid	Ask.
Calumet & Arizona	$10	$100.00	$105.00	Lake Sup. & Pitts Dev.	$10	$145.00	$150.00
Calumet & Bisbee	10	3.00	4.50	Pitts. & Duluth Dev.	15	33.50	36.00
Calumet & Cochise	10	5.00	5.50	Shakespeare	10	.....	.20
Calumet & Pittsburg	10	25.00	28.00	United Mexican	10	.....	.50
Higgins Development	10	2.00	2.50	Wolverine & Arizona	10	3.50	...
Junction Development	15	18.00	21.00	Yaqui	10	.....	1.00

MONTREAL.* Aug. 26

Company	Par Val	High	Low	Sales	Company	Par Val	High	Low	Sales
Dominion Coal	100	52.00	50.00	180	Montreal Steel	100	40.00	35.00	.....
Dom. Coal, Pf.	100	.....	.....	...	Mont'l Steel, Pf	100	100.00	75.00	.....
Dom. I. & St.	100	11.75	9.50	1,953	Nova Scotia St.	100	63.50	58.00	1,495
Dom. I. & St., Pf	100	34.00	31.00	360	N. S. Steel, Pf.	100	.....	.....	.....
Internat'l Coal	100	100.00	.....	....	Ogilvie	100	200.00	180.00	.....
Int'l Coal, Pf	100	100.00	.....	....	Ogilvie, Pf.	100	125.00	117.50	.....

*Montreal Stock Exchange. Total sales, 3,088 shares.

MEXICO. Aug. 19

Company	Shares Issued	Prices, Mex. Bid.	Ask.	Company	Shares Issued	Prices, Mex. Bid.	Ask.
DURANGO:				San Rafael y An., aviada	1,200	$710	$720
Ca. Min de Penoles	2,500	$2,700	$3,200	Soledad, aviada	670	905	910
San Andres de la Sierra	200	10,000	.....	Sorpresa, aviada	960	305	310
GUANAJUATO:				MEXICO:			
Angustias, Pozos	2,400	30	34	Alacran	2,400	20	28
Cinco Senores y An. aviadoras	2,000	33	35	Aldebarren	2,000	50	55
Cinco, Senores y An. aviada	400	33	35	Buen Despacho	3,000	58	62
Providencia,San Juan de la Luz	6,000	45	50	Dos Estrellas	3,000	2,100	2,050
Queensland y Australia	300	8	12	La Esperanza (El Oro.)	3,000	1,500	1,500
GUERRERO:				La Reformia, aviadores	2,000	28	32
Delfina, 1st serie	2,500	30	35	Santa Ana, Esperanza	2,400	60	80
Delfina, 2nd serie	2,500	25	30	MICHOACAN:			
Garduno y Anexas	7,200	35	40	Luz de Borda, aviadora	3,000	10	13
HIDALGO:				Luz de Borda, aviado	1,000	10	15
Amistad y Concordia	9,600	76	79	Santiago y An., Tlal.	4,000	7	10
Carmen, aviada	1,100	90	100	NUEVO LEON:			
GuadalupeFresnillo Mill	1,000	170	200	La Fraternal	1,000	580	620
GuadalupeFresnillo Mine	1,400	70	80	Norias de Bajan	1,000	880	920
La Reina y An., aviadora	5,600	3½	5	SAN LUIS POTOSI:			
Luz de Maravillas, aviadas	1,100	...	20	Concepcion y An	3,000	55	60
Maravillas y An., aviador	1,680	110	150	El Barreno, aviadora	2,000	80	82
Maravillas el Lobo	1,000	130	180	Sta.Maria de la Paz	9,600	190	195
Palma y An., aviador	1,800	4	8	San Diegoy Annexas	2,400	6	10
Refugio, aviada	12,800	680	740	ZACATECAS:			
Santa Anay An., aviadora	800	50	70	Asturiana y An.	2,500	18	25
Santa Anay An., aviada	600	25	35	Candelaria y Pinos	2,500	16	30
Sta. Gertrudis y An aviadas	9,600	13	14	Esperanza y An	2,400	6	8
Sta.Gertrudis y An. aviadora	28,800	75	76	Lourdes	2,500	21	25
Santo Tomas Apostol aviadoras	5,100	2	3	Luz de Minillas, pagadoras	2,000	.....	.....
San Felipe de Jesus aviadora	3,600	13	16	Nueva Quebradilla, aviadoras	2,400	16	25
San Felipe de Jesus aviada	1,200	4	5	Nueva Quebradilla, aviadas	600	20	30
San Rafael y An., Trompillo	1,200	1,885	1,900	San Carlos y Anexas	2,500	32	40
				Sta.Maria de Gaud.	2,500	100	110
				MISCELLANEOUS			
				Bartolome de Medina	2,000	97	100
				Naica (Chihuahua)	100	11,000	13,000
				Natividad(Oaxaca) aviadora	1,800	950	1,000
				San Francisco Hac	6,000	89	93
				Union Hacienda	3,000	315	340

LONDON. Aug. 19

Company.	Shares Issued.	Par value.	Latest dividend. Amt.	Date.	Quotations. Buyers.	Sellers.
		£. s. d.	s. d.		£. s. d.	£. s. d.
American:						
Alaska-Treadwell	200,000	5 0 0	2 0	July, 1904	4 10 0	4 15 0
Anaconda	1,200,000	5 0 0	2 0	May, 1904	3 18 9	4 1 3
*Camp Bird	820,000	1 0 0	9	Aug., 1904	1 8 0	1 9 0
Copiapo	112,500	2 0 0	6 10	May, 1903	1 0 0	1 5 0
De Lamar	80,000	1 0 0	1 6	May, 1904	13 9	16 3
El Oro	1,080,000	1 0 0	9	July, 1904	1 1 3	1 3 9
Esperanza	455,000	1 0 0	6	Aug., 1904		
Frontino & Bolivia	128,662	1 0 0	3 0	July, 1901	7 6	1 0 0
Le Roi	200,000	5 0 0	5 0	Nov., 1899	13 9	16 3
Le Roi No. 2	120,000	5 0 0	1 0	June, 1904	1 0 0	1 2 6
Palmarejo & Mexican	445,000	1 0 0	rts.	Apr., 1903	8 3	8 9
Standard	500,000	4 0	2½	Sept., 1903	2 0	3 0
Stratton's Independence	1,000,007	1 0 0	6	Dec., 1903	1 9	2 3
St. John del Rey	546,265	1 0 0	6	Dec., 1903	10 6	11 6
Tomboy	300,000	1 0 0	1 0	June, 1902	1 5 0	1 10 0
Ymir	200,000	1 0 0	1 0	Mar., 1902	2 6	5 0
European:						
Linares	15,000	3 0 0	5 0	Apr., 1904	3 5 0	3 15 0
Mason & Barry	185,172	1 0 0	7 0	May, 1904	2 15 0	3 0 0
Rio Tinto	325,000	5 0 0	37 6	May, 1904	53 12 6	53 17 6
Rio Tinto, preferred	325,000	5 0 0	2 6	May, 1904	6 0 0	6 5 0
Tharsis	625,000	2 0 0	7 0	May, 1904	4 2 6	4 7 6
West Australian:						
Associated	495,388	1 0 0	2 6	July, 1904	2 2 6	2 5 0
Cosmopolitan	400,000	1 0 0	1 0	Apr., 1904	6 3	6 9
Golden Horseshoe	300,000	5 0 0	6 0	Aug., 1904	6 17 6	7 0 0
Great Boulder	1,750,000	2 0	1 0	June, 1904	1 2 3	1 2 9
Gt. Boulder Persever'ce	1,400,007	1 0 0	1 0	Sept., 1904	12 6	13 0
Great Fingall	250,000	1 0 0	7 0	July, 1904	7 12 6	7 15 0
Ivanhoe	200,000	5 0 0	5 0	July, 1904	7 7 6	7 10 0
Kalgurli	120,000	1 0 0	2 6	July, 1904	5 3 9	5 6 3
Lake View	250,000	1 0 0	rts.	Aug., 1902	1 2 6	1 3 9
Oroya-Brownhill	450,000	1 0 0	3 0	Sept., 1904	3 6 3	3 7 6
Miscellaneous:						
Brilliant Central	100,000	1 0 0	1 0	July, 1904	2 7 6	2 12 6
Briseis	600,000	1 0 0	.....	.....	7 6	8 0
Broken Hill	960,000	8 0	1 0	Aug., 1904	2 2 0	2 3 0
Mt. Lyell	275,000	3 0 0	1 3	June, 1904	13 3	13 9
*Mt. Morgan	1,000,000	1 0 0	3	Aug., 1904	1 18 9	2 1 3
Waihi	497,412	1 0 0	2 6	Sept., 1904	5 12 6	5 15 0
Indian:						
Champion Reef	513,832	10 0	1 4	Sept., 1904	1 12 0	1 13 0
Mysore	566,043	10 0	4 6	July, 1904	6 8 9	6 11 3
Nundydroog	484,000	10 0	1 3	July, 1904	1 9 11	1 11 1
*Ooregum	343,000	10 0	1 3	Aug., 1904	17 0	18 0
*Ooregum, pfd.	240,000	10 0	4	Aug., 1904	1 8 9	1 11 3
South African:						
Angelo	600,000	1 0 0	7 0	Aug., 1904	6 16 3	6 18 9
*Bonanza	200,000	1 0 0	8 0	Aug., 1904	1 1 3	1 3 9
British South Africa	4,436,019	1 0 0	rts.	May, 1899	1 8 9	1 10 0
Cape Copper	300,000	2 0 0	2 6	July, 1904	3 2 6	3 5 0
Cape Copper, pfd.	75,000	2 0 0	2 6	July, 1904	3 2 6	3 7 6
City & Suburban	340,000	4 0 0	4 0	Aug., 1904	5 13 9	5 16 3
Consol. Gold-Fields	2,000,000	1 0 0	.....	.....	6 2 6	6 5 0
Crown Reef	120,000	1 0 0	6 0	Aug., 1904	14 5 0	14 15 0
De Beers, preferred	800,000	2 10 0	10 0	Aug., 1904	18 8 9	18 11 3
De Beers, deferred	1,000,000	2 10 0	12 6	Aug., 1904	18 11 3	18 13 9
East Rand	990,000	1 0 0	5 0	July, 1903	8 0 0	8 2 6
*Ferreira	90,000	1 0 0	22 6	Aug., 1904	20 5 0	20 15 0
*Geldenhuis	200,000	1 0 0	7 0	Aug., 1904	5 5 0	5 7 6
Geduld	400,000	1 0 0	rts.	Mar., 1902	6 5 0	6 7 6
*Henry Nourse	125,000	1 0 0	8 0	Aug., 1904	8 0 0	8 5 0
Jubilee	50,000	1 0 0	5 0	Aug., 1904	4 12 6	4 17 6
Jumpers	100,000	1 0 0	2 6	May, 1904	2 15 0	3 0 0
*Langlaagte	470,000	1 0 0	2 0	Aug., 1904	2 11 3	2 13 9
*May	288,750	1 0 0	3 0	Aug., 1904	3 17 6	4 0 0
*Meyer & Charlton	100,000	1 0 0	5 0	Aug., 1904	5 7 6	5 12 6
Modderfontein	290,000	1 0 0	rts.	Apr., 1902	8 11 3	8 13 9
Namaqua	94,331	2 0 0	3 0	Dec., 1903	2 15 0	3 0 0
New Jagersfontein	200,000	5 0 0	10 0	June, 1904	27 5 0	27 15 0
New Primrose	325,000	1 0 0	3 0	Aug., 1904	3 13 9	3 16 3
*Rand	1,795,956	5 0 0	5 0	Aug., 1902	10 1 3	10 3 9
*Robinson	750,000	5 0 0	6 0	Aug., 1904	9 0 0	9 5 0
Robinson Deep	950,000	1 0 0	3 0	Aug., 1904	5 6 3	5 8 9
*Rose Deep	425,000	1 0 0	3 0	Aug., 1904	8 12 6	8 17 6
Salisbury	100,000	1 0 0	2 0	Sept., 1904	1 10 0	1 15 0
Village Main Reef	400,000	1 0 0	4 0	July, 1904	6 7 6	6 12 6
Wemmer	80,000	1 0 0	12 6	July, 1904	10 10 0	11 0 0

*Ex-dividend.

LONDON (By Cable.)*

Company	Aug. 24 £	s.	d	Aug. 31 £	s.	d	Company	Aug. 24 £	s.	d.	Aug. 31 £	s.	d.
Camp Bird	1	8	9	1	9	6	Esperanza		19	0		19	3
Con. Gold Fields	6	1	3	6	5	0	Modderfontein	8	10	0	8	15	0
De Beers	.....			18	15	0	Rand Mines	10	0	0	10	3	9
Dolores	1	1	6	1	1	6	Rio Tinto	53	17	6	54	2	6
East Rand	7	19	4½	8	1	10	Simmer & Jack	1	13	1½	1	13	9
El Oro	1	3	1½	1	3	1½	Tomboy	1	2	6	1	2	6

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

PARIS. Aug. 11.

Company.	Location.	Capital Stock.	Par value.	Latest dividend	Prices. Opening	Closing
		Francs.	Fr.	Fr.	Fr.	Fr.
Anzin, Coal	France	.....	.....	290.00	5,671.00	5,650.00
Boleo, c	Lower Cal.	12,000,000	500	104.17	1,920.00	1,940.00
Champ d'Or, g	S. Africa	3,375,000	25	3.75	16.50	16.50
Courrieres, Coal	France	600,000	500	110.00	2,860.00	2,890.00
Fraser River, g	Brit. Col.	250,000	25	.....	5.50	5.50
Huanchaca, s	Bolivia	40,000,000	125	2.50	93.00	95.25
Laurium, z. l	Greece	16,300,000	500	25.00	300.00	300.00
Malfidano, z	Italy	12,500,000	500	50.00	590.00	590.00
Metaux, Cie. Fran. de	France	25,000,000	500	22.50	481.00	481.00
Mokta-el-Hadid, i. l	Algeria	18,312,000	500	40.00	909.00	925.00
Nickel, n	N. Caledonia	15,000,000	250	22.50	550.00	556.00
Penarroya, Coal	Spain	.....	500	45.00	1,035.00	1,064.00
Vielle Montagne z	Belgium	9,000,000	30	30.00	719.00	719.00

c—Copper. g—Gold. i—Iron. l—Lead. n—Nickel. o—Oil. s—Silver. z—Zinc.

DIVIDENDS.

GOLD, SILVER, LEAD, QUICKSILVER AND ZINC COMPANIES.—UNITED STATES.

Name and Location of Company.		Author-ized Capital.	Shares. Issued.	Par Val $	Dividends. Paid in 1904	Total to Date.	Latest. Date	Amt.
Acacia, g	Colo.	$1,500,000	1,443,000	1	.....	$57,560	Apr .1903	$0.01
Adams, s.l.c.	Colo.	1,500,000	150,000	10	.....	738,500	Oct .1902	.05
Aetna Con., q	Cal.	500,000	100,000	5	.....	325,000	Apr .1900	.15
Alaska-Mexican, g.	Alaska	1,000,000	180,000	5	$81,000	654,381	July.1904	.15
Alaska-Treadwell,g	Alaska	5,000,000	200,000	25	325,000	5,370,000	July.1904	.50
Amalgamated, c	Mont	155,000,000	1,530,879	100	2,308,290	25,042,697	Aug.1904	.50
Am.Sm.& Ref.,com	U. S.	50,000,000	500,000	100	1,875,000	1,875,000	July.1904	1.25
Am.Sm.& Ref.,pf	U. S.	50,000,000	500,000	100	2,625,000	15,016,553	July.1904	1.75
Anaconda, c	Mont	30,000,000	1,200,000	25	600,000	23,850,000	May.1904	.50
Annie Laurie, g	Utah	5,000,000	25,000	100	112,500	387,500	Aug.1904	.50
Arizona, c	Ariz.	3,775,000	.....	....	815,548	5,483,806	July.1904	....
Bald Butte, g.s	Mont	250,000	200,000	1	25,000	1,337,148	Jan .1904	.12½
Big Six, s.l	Colo.	500,000	500,000	1	.....	17,500	Nov.1903	.00½
Bonanza King, g	Colo.	1,000,000	1,000,000	1	5,000	5,000	Feb .1904	.00½
Boston&Colo.Sm	Colo.	750,000	15,000	50	.....	402,350	Oct .1902	.75
Boston & Mont.	Mont	3,750,000	150,000	25	1,050,000	29,375,000	July.1904	3.00
Breece, l.s	Colo.	5,000,000	200,000	25	.....	200,000	June 1904	.05
Bunker Hill & Sull.	Idaho	3,000,000	300,000	10	438,000	1,964,000	Aug.1904	.25
Butler-Liberal g.s	Utah	500,000	500,000	1	.....	2,500	Dec .1903	.00½
Butte & Boston, c	Mont	2,500,000	200,000	25	200,000	1,800,000	Feb .1904	1.00
Calumet&Arizona,c	Ariz	2,500,000	200,000	10	600,000	1,000,000	June 1904	1.50
Calumet & Hecla, c	Mich.	2,500,000	100,000	25	2,000,000	85,350,000	June 1904	10.00
Camp Bird, g	Colo.	5,500,000	820,000	5	639,600	1,607,304	Aug.1904	.15
Cashier	Colo.	1,000,000	900,000	1	8,340	26,160	Apr .1904	.00½
Center Creek, l.s.	Mo.	1,000,000	100,000	10	10,000	140,000	Apr .1904	.10
Central Eureka, g.	Cal.	4,000,000	398,425	10	71,725	307,710	July.1904	.05
Central, l	Mo.	1,000,000	10,000	100	30,000	415,000	Aug.1904	.50
Century, g.s.l	Utah	150,000	150,000	1	25,000	33,000	Aug.1904	.02
C. K. & N., g	Colo.	1,500,000	1,431,900	1	71,595	143,190	July.1904	.01
Clinton, g.s	Colo.	100,000	1,000	100	.....	60,000	Dec .1903	.30
Con. Mercur, g	Utah	5,000,000	1,000,000	5	.....	1,030,000	May.1903	.03
Continental, z	Mo.	550,000	22,000	25	26,400	79,200	July.1904	.40
Daly-West, g.s.l	Utah	3,600,000	180,000	20	756,000	4,247,000	Aug.1904	.40
De Lamar, g.s	Idaho	400,000	67,180	5	24,184	2,764,524	May.1904	.36
Deadwood-Standpf	So.Dak.	600,000	600,000	1	.....	6,000	Dec .1903	.01
Doe Run, l	Mo.	1,500,000	15,000	100	67,500	694,572	July.1904	1.50
Elkton Con., g	Colo.	3,000,000	2,500,000	1	.....	1,404,461	Mar .1902	.04
El Paso, g	Colo.	2,500,000	2,450,000	1	85,750	250,050	May.1904	.01
Federal Sm., com.	Idaho	10,000,000	52,500	100	157,500	157,500	Sept.1904	1.50
Federal Sm., pf.	Idaho	20,000,000	105,000	100	551,250	735,000	Sept.1904	1.75
Gemini, g.s.l	Utah	500,000	5,000	100	50,000	1,100,000	Mar .1904	10.00
Gold Coin, g	Colo.	1,000,000	1,000,000	1	.....	1,230,000	Jan .1903	.01
Gold King	Colo.	1,000,000	936,850	1	14,053	473,109	Jan .1904	.01½
Golden Cycle, g	Colo.	2,000,000	1,500,000	1	.....	303,750	Aug.1903	.03
Good Hope, g.s	Colo.	50,000	500	100	.....	941,250	Jan .1903	.25
Grand Central, g.	Utah	250,000	250,000	1	150,000	1,041,250	July.1904	.10
Gwin, g	Cal.	1,000,000	100,000	10	.....	426,500	Dec .1902	.15
Hecla, s.l	Idaho	250,000	1,000,000	½	30,000	150,000	May.1904	.01
Hecla Con., s.l	Mont	1,500,000	30,000	50	.....	2,930,550	Apr .1902	.25
Hercules-Horsh'e,g	Cal.	1,000,000	340,000	1	2,250	2,250	June 1904	.00½
Homestake, g	So.Dak.	21,840,000	218,400	100	436,800	12,804,550	Aug. 1904	.25
Horn Silver,g.s.c.l	Utah	10,000,000	400,000	25	40,000	5,402,000	June 1904	.05
Internat. Nickel, pf	U. S.	12,000,000	87,415	100	.....	349,660	May.1903	10.00
Iowa, g.s.l	Colo.	1,666,667	1,666,667	1	50,001	386,838	July.1904	.01
Iron Silver	Colo.	10,000,000	500,000	20	200,000	3,050,000	Aug.1904	.10
Jamison, g	Cal.	3,900,000	390,000	10	35,100	156,000	July.1904	.03
Kendall, g	Mont	2,500,000	500,000	5	225,000	530,000	July.1904	.10
Last Dollar, g	Colo.	1,500,000	1,500,000	1	.....	240,000	Mar .1904	.02
Liberty Bell, g	Colo.	700,000	130,349	1	39,104	130,337	Apr .1904	.15
Lightner, g	Cal.	125,000	102,255	1	42,041	228,656	Aug.1904	.05
Lyon, z.l	Mo.	50,000	4,000	10	1,200	1,200	Apr .1904	.30
Mammoth, g.s.l	Utah	10,000,000	400,000	25	20,000	1,880,000	July.1904	.05
Mary McKinney, g.	Colo.	1,000,000	1,000,000	1	60,000	620,000	July.1904	.03
May Day, g	Utah	100,000	400,000	¼	.....	30,000	Mar. 1902	.01
Mine La Motte, l	Mo.	3,300,000	300,000	10	60,000	300,000	Jan .1904	.20
Mines Co. of Am.	U. S.	2,000,000	2,000,000	1	200,000	655,000	Aug.1904	.01½
Modoc, g.s	Colo.	500,000	500,000	1	.....	270,000	Dec .1903	.01
Mont. Ore Purch.	Mont	2,500,000	81,000	25	324,000	3,618,000	Apr. 1904	4.00
Mont.-Tonopah, g.	Nev	1,000,000	885,000	1	.....	42,750	Dec. 1903	.05
Mountain, c	Cal.	6,250,000	250,000	25	.....	3,776,250	May.1903	1.57
Napa Con., q	Cal.	700,000	100,000	7	.....	1,180,000	Oct .1902	.10
Nat. Lead, pf	U. S.	15,000,000	149,040	100	782,460	14,754,628	Sept.1904	1.75
Nevada Keystone,g	Nev	1,000,000	638,877	1	19,166	61,790	Feb. 1904	.03
New Century, z	Mo.	150,000	150,000	1	6,750	6,750	Sept.1904	.00½
New Idria, q	Cal.	500,000	100,000	5	120,000	640,000	July.1904	.30
New Jersey, z	U. S.	10,000,000	100,000	100	600,000	6,600,000	May.1904	3.00
New Lead. Home	Colo.	2,000,000	2,000,000	1	.....	265,500	Feb. 1902	.00½
North Star, g	Cal.	2,500,000	250,000	10	62,500	768,856	July.1904	.25
NorthernLight,g.s.	Utah	2,000,000	400,000	5	20,000	20,000	Feb. 1904	.05
Old Gold, g	Colo.	2,101,150	2,101,150	1	10,506	10,506	Mar. 1904	.00½
Ontario, s.l	Utah	15,000,000	150,000	100	.....	14,917,000	Dec. 1902	.30
Ophir, g.s	Nev	302,400	100,800	3	221,850	1,797,400	July.1904	.25
Osceola, c	Mich	2,500,000	96,150	25	192,300	4,439,600	July.1904	1.00
Oustomah, g	Cal.	250,000	250,000	1	12,500	12,500	Mar. 1904	.05
Parrot, c	Mont	2,300,000	229,850	10	114.925	5,887,860	Aug.1904	.50
Pennsylvania, g	Cal.	5,150,000	51,500	100	36,200	228,275	Aug.1904	.10
Portland, g	Colo.	3,000,000	3,000,000	1	540,000	5,197,080	July.1904	.06
Quicksilver, pf	Cal.	4,300,000	43,000	100	.....	1,931,411	May.1903	.50
Quilp, g	Wash.	1,500,000	1,500,000	1	15,000	15,000	Apr. 1904	.01
Quincy, c	Mich	2,500,000	100,000	25	500,000	14,620,000	Aug.1904	2.50
Red Bird, g.s.c.l	Mont	1,500,000	300,000	5	24,000	60,000	Aug.1904	.01
Rob Roy, z	Mo.	15,000	13,825	1	692	2,945	May.1904	.03
RoccoHomest'k,l.s	Nev	300,000	300,000	1	4,000	94,000	Jan .1904	.01
Sacramento, g	Utah	5,000,000	1,000,000	5	15,000	208,000	July.1904	.00½
St. Joseph, l	Mo.	6,000,000	375,000	10	112,500	3,947,000	June 1904	.15
Silver Hill, g.s	Nev	180,000	180,000	1	18,000	46,800	Mar. 1904	.05
Silver King, g.s.l	Utah	3,000,000	150,000	20	800,000	8,150,000	Aug.1904	.66⅔
Smuggler, s.l.s	Colo.	1,000,000	1,000,000	5	.....	2,175,000	Feb. 1902	.01
South Swansea	Utah	300,000	300,000	1	3,000	168,000	Apr. 1904	.01
Spearfish, g., pf.	So.Dak.	1,000,888	882,000	1	8,820	105,840	July.1904	.00½
Specie Payment, g.	Colo.	1,000,000	1,000,000	1	.....	65,190	Oct .1903	.01
Standard Con.,g.s	Cal.	2,000,000	178,394	10	53,517	1,231,687	Aug.1904	.10
Standard, c	Ariz.	500,000	500,000	1	.....	40,000	Sept.1903	.05
Stratton'sIndepend	Colo.	5,500,000	1,000,007	5	.....	4,130,860	Dec. 1903	.12½
Swansea, s.l	Utah	500,000	100,000	5	.....	330,050	June 1902	.05
Tamarack, c	Mich	1,500,000	60,000	25	90,000	8,680,000	Jan. 1904	1.50
Tennesse,'c	Tenn.	5,000,000	175,000	25	218,750	437,500	Jan .1904	1.25
Tetro, g.l	Utah	300,000	300,000	1	9,000	9,000	Aug.1904	.01
Tomboyg.s	Colo.	1,500,000	300,000	5	.....	1,244,000	July.1902	.24
Tonopah Alpine, g.	Nev	700,000	700,000	1	.....	70,000	Dec. 1903	.10
Town Topics, g.s.	Colo.	1,000,000	1,000,000	1	.....	50,000	Nov.1903	.00½
Trinity County, g.	Cal.	1,000,000	99,003	10	.....	34,561	July.1903	.05
Uncle Sam	Utah	200,000	200,000	1	5,000	50,000	Aug.1904	.02½
United (Creede), g.	Colo.	500,000	500,000	1	10,000	55,000	Mar. 1904	.02
Union, g	Colo.	1,250,000	1,250,000	1	.....	445,244	Jan .1903	.02
United, c., pf.	Mont	5,000,000	50,000	100	150,000	600,000	May.1904	3.00
United, s.l., com	Mo.	5,000,000	78,900	5	.....	30,725	Oct .1903	.05
United, s.l., pf	Mo.	1,000,000	18,998	25	18,998	144,354	July.1904	.50
United Verde, c	Ariz.	3,000,000	300,000	10	900,000	15,960,322	June 1904	.75
U.S.Red.&Ref.,cm	Colo.	6,000,000	59,188	100	.....	414,078	Oct .1903	1.00
U.S.Red.&Ref., pf	Colo.	4,000,000	39,458	100	.....	472,821	Oct. 1903	1.50
United States,g.s.c	Utah	21,500,000	420,000	25	210,000	210,000	Aug.1904	.50
Utah, g	Utah	1,000,000	100,000	10	4,000	225,000	June 1904	.01
Utah Con., c	Utah	1,500,000	300,000	5	900,000	2,586,000	July.1904	1.50
Vindicator Con., g.	Colo.	1,500,000	1,100,000	1	66,000	1,181,000	July.1904	.03
Waldorf, g	Colo.	3,000,000	3,000,000	1	.....	15,000	Aug.1904	.00½
Wasp No. 2, g	So.Dak.	500,000	147,900	1	16,269	234,679	June 1904	.03
Wolverine, c	Mich	1,500,000	60,000	25	210,000	1,530,000	Apr. 1904	3.50
Yellow Aster, g	Cal.	1,000,000	100,000	10	30,000	583,789	Feb. 1904	.15

COAL, IRON AND OTHER INDUSTRIALS.

Name and Location of Company.		Author-ized Capital.	Shares. Issued.	Par Val $	Dividends. Paid in 1904	Total to Date.	Latest. Date	Amt.
Ala.Con.,C.& I.,pf.	Ala.	$2,500,000	$24,638	100	$86,234	$775,914	June 1904	$1.75
Ala.& Ga.Iron, pf.	Ala.	650,000	6,500	100	.....	6,500	Jan .1903	1.00
Allis-Chalmers, pf	U. S.	25,000,000	200,000	100	350,000	3,213,750	Feb. 1904	1.75
Alma Oil	Cal.	400,000	380,000	1	.....	45,600	Dec. 1903	.03
Amer.Ag.Chm.,pf	U. S.	20,000,000	181,350	100	535,990	5,206,750	Apr. 1904	3.00
American Cement	Pa	2,000,000	200,000	10	160,000	700,000	July.1904	.40
American Coal	Md.	1,500,000	50,000	25	125,000	1,557,500	Sept.1904	1.25
Aztec Oil	Cal.	250,000	235,000	1	.....	43,050	Sept.1903	.03
Bon Air C.& I.,pf.	Tenn.	2,500,000	18,803	100	84,615	221,551	July.1904	1.50
Cambria Steel	Pa	50,000,000	900,000	50	1,350,000	7,800,000	Aug.1904	.75
Central C.&C.,com.	Mo.	5,125,000	51,250	100	230,625	781,875	July.1904	1.50
Central C.& C.,pf.	Mo.	1,875,000	18,750	100	70,311	867,183	July.1904	1.25
Central Oil	W. Va	1,500,000	60,000	25	45,000	197,500	Aug.1904	.25
Claremont Oil	Cal.	500,000	500,000	1	15,000	15,000	Aug.1904	.01
Colo.Fuel&I.,com	Colo.	38,000,000	239,310	100	.....	1,642,500	Apr. 1902	1.75
Colo.Fuel & I.,pf.	Colo.	2,000,000	20,000	100	.....	1,560,000	Feb. 1903	4.00
Colum.&Hock.C&I	Ohio	70,000,000	69,244	100	51,933	138,464	Aug.1904	.25
Consolidated Coal	Ill.	5,000,000	50,000	100	100,000	400,000	Apr. 1904	1.00
Consolidation Coal	Md.	10,250,000	102,500	100	410,000	6,946,650	Feb. 1904	4.00
Crucible Steel, pf.	U. S.	25,000,000	250,000	100	.....	5,250,000	Sept.1903	1.75
Cummings Cement	N. Y.	300,000	3,000	100	.....	216,000	July.1903	9.00
Dabney Oil	Cal.	1,200,000	1,000,000	1	37,500	182,500	Feb. 1904	.03¾
Empire S.& I., pf.	U. S.	5,000,000	23,700	100	44,250	611,900	July.1904	1.50
Fairmont Coal	W. Va	12,000,000	120,000	100	240,000	240,000	Feb. 1904	2.00
Four Oil	Cal.	300,000	208,700	1	16,696	77,058	Aug.1904	.01
General Chem.,com	U. S.	12,500,000	74,103	100	.....	1,300,507	Dec. 1903	1.25
General Chem., pf.	U. S.	12,500,000	100,000	100	600,000	3,175,178	Oct. 1904	1.50
Giant Oil	Cal.	800,000	800,000	1	.....	144,000	Jan .1904	.02
Home Oil	Cal.	100,000	100,000	1	10,000	502,500	Aug.1904	.02½
Houston Oil, pf.	Tex	7,500,000	75,000	100	.....	896,500	Feb. 1903	3.00
Imperial Oil	Cal.	1,000,000	100,000	100	180,000	680,000	Sept.1904	.20
Int'l Acheson, pf.	N. Y.	500,000	5,000	100	.....	105,000	July.1903	3.50
Jeff.&Cl'f.C.&I.cm	Pa	1,500,000	15,000	100	75,000	225,000	Aug.1904	5.00
Jeff.&Cl'f.C.&I., pf	Pa	1,500,000	15,000	100	75,000	675,500	Aug.1904	2.50
Keystone Oil	Colo.	2,000,000	2,000,000	1	8,000	8,000	July.1904	.00½
Lehigh Coal & Nav	Pa	14,346,650	286,933	50	502,133	21,543,582	May.1904	1.75
Maryland Coal, pf.	Md.	2,000,000	18,850	50	65,975	1,112,110	June 1904	3.00
Monong.R.Coal,pf	Pa	10,000,000	97,300	100	347,165	3,124,485	Jan. 1904	3.50
Monte Cristo Oil	Cal.	500,000	500,000	1	30,000	65,000	Aug.1904	.01
National Carbon,pf	U. S.	4,500,000	45,000	100	236,250	1,811,250	Aug.1904	1.75
New Central Coal	Md.	1,000,000	50,000	20	20,000	270,000	Mar. 1904	.40
Ohio & Ind. Gas.	U. S.	10,000,000	900,000	100	.....	1,440,000	Dec. 1903	1.00
Oil City Petroleum	Cal.	500,000	500,000	1	12,500	12,500	Aug.1904	.00½
Pacific Coast Borax	Cal.	2,000,000	19,000	100	324,000	1,858,500	Aug.1904	1.00
Peerless Oil	Cal.	1,000,000	92,000	10	102,960	293,360	Aug.1904	.14
Penna. Salt	Pa	3,000,000	60,000	50	180,000	13,630,000	Apr. 1904	3.00
Penna. Steel	Pa	25,000,000	168,214	100	1,588,749	4,094,499	May.1904	3.50
Phila. Gas, com	Pa	28,953,029	579,061	50	1,196,664	4,613,495	Aug.1904	.75
Phila. Gas, pf.	Pa	5,744,813	114,896	50	287,212	1,439,885	June 1904	1.25
Pittsburg Coal, pf	Pa	32,000,000	297,012	100	1,559,313	9,875,649	July.1904	1.75
Pittsburg Oil	Cal.	300,000	240,000	1	.....	48,000	Dec. 1903	.02½
PocahontasColl.,pf	W. Va	1,500,000	15,000	100	60,000	250,000	Aug.1904	.50
Rep.Iron&Steel,pf.	U. S.	25,000,000	204,169	100	.....	6,053,476	Oct. 1903	1.75
San Joaquin Oil	Cal.	100,000	100,000	1	440,000	625,000	Mar. 1904	2.20
Shelby Iron	Ala.	1,000,000	10,000	100	.....	840,000	Nov.1903	5.00
Sloss-Sheffield, pf	Ala.	20,000,000	67,000	100	351,750	2,087,750	July.1904	1 75
Somerset Coal	Pa	4,000,000	40,000	100	80,000	80,000	Feb. 1904	2.00
St.Bernard C.&C.	Ky.Ten	1,000,000	10,000	100	.....	770,000	Dec. 1903	6.00
Standard Oil	U. S.	100,000,000	970,000	100	28,130,000	236,110,000	Sept.1904	5.00
Sunday C'kCoal,pf.	Ohio	1,500,000	15,000	100	.....	15,750	Aug.1903	3.00
Susq.I.& S., pf.	Pa	1,500,000	300,000	5	.....	762,500	June 1903	3.15
Temple Iron	Pa	240,000	2,400	100	.....	21,500	July.1903	2.00
Tenn. C. I., com.	Tenn.	23,000,000	225,536	100	.....	1,102,600	Nov.1900	2.00
Tenn. C. I., pf.	Tenn.	248,000	2,480	100	14,880	321,984	Aug.1904	2.00
Thirty-three Oil	Cal.	500,000	100,000	5	80,000	320,000	Aug.1904	.10
Thomas Iron	Pa	2,500,000	25,000	200	.....	200,000	Aug.1903	4.00
Tidewater Steel, pf	Pa	600,000	60,000	1	.....	30,000	July.1903	.20
Union Oil	Cal.	10,000,000	52,672	100	73,740	889,682	Apr. 1904	.70
Union Nat'l Gas	Pa	8,000,000	22,500	100	135,000	315,000	July.1904	2.00
U.S.SteelCorp.,cm.	U. S.	550,000,000	5,083,025	100	.....	53,360,978	Dec. 1903	1.50
U.S.Steel,Corp.,pf.	U. S.	360,281,100	3,602,811	100	18,916,913	111,702,816	Aug.1904	1.75
Va.CarolinaCh.,cm	U. S.	38,000,000	279,844	100	.....	3,678,829	June 1903	1.25
Va.CarolinaCh.,pf	U. S.	20,000,000	180,000	100	840,000	7,860,889	July.1904	2.00
Westmoreland Coal	Pa	3,000,000	60,000	50	.....	8,250,000	Sept.1903	.50
West Shore Oil	Cal.	100,000	100,000	1	25,000	130,000	Aug.1904	.05

CANADA, CENTRAL AND SOUTH AMERICA, MEXICO.

Name and Location of Company.		Author-ized Capital.	Shares. Issued.	Par Val $	Dividends. Paid in 1904	Total to Date.	Latest. Date	Amt.
Amistad y Conc'dia	Mex.	$480,000	9,600	50	$61,482	$226,768	July.1904	$1.67
Barreno, g.s	Mex.	12,000	2,400	5	6,036	69,982	Aug.1904	.90
Bart. de MedinaMil	Mex.	50,000	2,000	25	13,343	93,071	Aug.1904	.69
Buena Vista, g.s	Mex.	100,000	1,000	100	.....	5,000	June 1903	5.00
Butter'sSalvador,g	Salv.	750,000	150,000	5	112,500	487,500	July.1904	.25
CaribooMcKin'y,gs	B. C.	1,250,000	1,250,000	1	50,000	546,837	Feb. 1904	.04
Carmen, g.s	Mex.	27,500	1,100	25	.....	78,616	Nov. 1903	.99
Carmen-Guanaj.g.s	Mex.	725,000	145,000	5	.....	27,750	Oct. 1903	.12½
Cinco Senores	Mex.	.....	2,000	....	.....	711,935	July.1903	4.10
Copiapo, c	Chile	1,125,000	112,500	10	.....	2,865,900	Feb. 1903	.36
Crow's Nest Pass.	N. S.	3,500,000	121,486	25	172,524	968,947	Apr. 1904	2.50
DominionCoal,com	N. S.	15,000,000	150,000	100	.....	1,050,000	Dec. 1903	1.75
DominionCoal,pf.	N. S.	3,000,000	30,000	100	120,000	2,400,000	July.1904	4.00
Dominion I.&S.,pf.	N. S.	5,000,000	50,000	100	.....	875,000	Sept.1903	3.50
Doe Estrellas, g.s	Mex.	150,000	3,000	50	106,950	689,775	Aug.1904	4.60
El Oro, g.s	Mex.	5,750,000	1,080,000	5	194,400	2,708,800	July.1904	.18
Esperanza, s.g	Mex.	2,275,000	455,000	5	168,350	1,322,549	Aug.1904	.12
Fraternal, s	Mex.	5,000	1,000	5	23,875	75,138	Aug.1904	2.38
Granby Con.	B. C.	13,363,030	1,336,303	10	.....	133,630	Dec. 1903	.10
Greene Con., c	Mex.	8,640,000	864,000	10	518,400	1,170,220	Aug.1904	.30
Guadalupe	Mex.	1,000,000	10,000	100	.....	3,515,750	Apr. 1903	.77
Guggenheim Expl.	Mex.	17,000,000	105,000	100	551,250	1,102,500	July.1904	1.75
Le Roi No. 2, g	B. C.	3,000,000	120,000	35	57,600	345,600	June 1904	.24
Mex. Coal & Coke	Mex.	5,000,000	50,000	100	150,000	130,000	June 1904	3.00
Natividad, s.g	Mex.	36,000	2,400	15	96,000	368,463	Aug.1904	5.00
N.Y.& Hond.Ros.	C. A.	1,500,000	150,000	10	75,000	1,860,000	July.1904	.10
N.Y.St.&Coal,com.	N. S.	5,000,000	50,000	100	213,600	638,600	Apr. 1904	3.00
N.Y.St.& Coal,pf.	N. S.	2,000,000	10,300	100	41,200	247,200	Apr. 1904	2.00
Penoles, s.g	Mex.	125,000	2,500	50	358,000	2,846,114	Aug.1904	18.40
Providence, g.s	B. C.	200,000	40,000	5	4,000	6,224	June 1904	.10
Providencia (S.J.)	Mex.	90,000	6,000	15	.....	169,740	Feb. 1903	.77
Real del Monte	Mex.	.....	2,554	....	11,238	2,938,122	Jan. 1904	4.40
San Francisco Mill.	Mex.	150,000	6,000	25	10,920	298,080	Aug.1904	.68
San Rafael	Mex.	60,000	2,400	25	189,845	2,226,362	Aug.1904	.....
Soledad, s.l	Mex.	19,200	960	20	45,190	309,832	Aug.1904	9.15
Sorpresa, g.s	Mex.	19,200	960	20	19,294	219,360	Aug.1904	2.29
Sta.Gertrudis, g.s	Mex.	1,920,000	38,000	50	67,936	2,848,096	July.1904	.....
St.John del Rey, g.	Brasil.	3,000,000	546,265	5	.....	14,158,949	Dec. 1903	.12
Sta.Maria de la Paz	Mex.	.....	2,400	....	27,106	1,989,479	Aug.1904	2.39
TorreonMetallurg'l	Mex.	1,500,000	30,000	50	.....	269,500	May.1903	8.98
Tyee, c	B. C.	940,000	180,000	5	43,200	43,200	Apr. 1904	.24
Union Mill	Mex.	150,000	3,000	50	16,170	429,593	May.1904	1.79

NOTE. These dividends are published gratuitously. Readers are invited to send any additions or corrections which they think necessary to complete our list